

REPORT
OF
THE FIFTH
INDIAN INDUSTRIAL
CONFERENCE

HELD AT LAHORE

ON THE

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INTRODUCTION

'Rome was not built in a day, and nation-building, to be of a permanent order, is necessarily a very slow evolutionary process. We are sometimes apt to get impatient and to hurry forward to reach a goal without going through the intermediate disciplinary stages which are necessary. But the more haste the worse speed. We must be content to do the work that lies before us in our life time ; to carry on the torch in our own day, and pass it with undimmed lustre to our successors in the race.

The work of nation-building requires the co-operation of all sections of the community. And it is gratifying to find that this feeling of good-fellowship and co-operation is beginning to manifest itself largely amongst the Mahomedan and Hindu communities everywhere in India. And why should it not be so ? Why should not all the separate sections come closer together in furthering the common interests of the country ? We can be—

“ distinct as the billows,
yet one as the sea.”

Differences in religions, creeds and rituals there will always be amongst us, but these need not interfere with entire community of feeling and co-operative unity of spirit in promoting the material, social, intellectual, political and moral progress of India'.—(Presidential address of Maharaja Sir Rameshwar Singh Bahadur, p 15 of the Report)

'I wish the conditions in India would change, that the rulers will carry the collected will of the people with them, and thereby secure 'the co-operation of the growing Patriotism in the country.' (Lala Harkishen Lal, p. 10)

' Indian conditions call for combination both in the conduct of manufactures and in the procuring and producing of raw materials.' (Mr. Frederick Noel Paton, pp. 35 & 40)

' No one will deny that India has produced in the past, and is still able to produce, men whose intellects are as acute as any that are to be found in the western world.' (Dr. T. H. D. La Touche, p. 81)

' Are you content merely to receive such a share of the profits as is derived from investments in mining and manufacturing concerns, a poor way of making money at best, looking on while your country is being depleted of the raw material with which Nature has so bountifully supplied you, and compelled to pay highly for the metals which might be supplied very largely from your own mines, and for the articles manufactured from them ? ' (*Ibid*, p. 82)

As a permanent and useful co-worker with the Indian National Congress, the Indian Industrial Conference is holding its Sessions year after year during the Congress week. In consonance with this practice, the Fifth Indian Industrial Conference was held at Lahore in the Bradlaugh Hall, on Thursday, the 30th December 1909.

The severity of the Lahore winter, coupled with the fact that the Session of the Industrial Conference had to be held after the close of the Congress, affected its attendance and marred to some extent its success. The number which was between 6 and 7 hundred was in itself not unsatisfactory. What was noticeable and regrettable, was that the majority of the Congress leaders, who were in Lahore the day before had either gone away or did not care to attend. The gathering though not so large as most previous ones however, included several leading men of the Punjab and the N.-W. P., frontier provinces and influential representatives from Kashmir and other parts of India. The assembly consisted of men who take real interest in Industrial matters. And so far as the transaction of solid work is concerned, the Session can bear favourable comparison with any of its predecessors. The programme of the Indian Social Conference also, which was held on the same day, at about 3 P.M., interfered not a little with the work of the Industrial Conference, which had, on account of the crowding of functions to get through a mass of business within the short space of about 4 hours. The experience of the Madras Conference clearly points to the necessity of reserving at least two days for the work of this Conference and holding its Sessions before the close of the Congress Session. Otherwise, the Conference has to rush its programme through and the time required for the proper discussion and deliberation of important subjects is not obtained. The Industrial Conference, cannot rest content with merely passing a few formal or academic resolutions. Its work is eminently of a practical nature. Industrial questions are occupying in recent

years an increasing share of public attention, all over the country throughout the year. Economic and Industrial questions demand such thorough and informed discussion that adoption of measures to give a practical shape to any one of them may well claim the whole time of a Session of the Conference. For instance, in considering a question like the Sugar industry, a number of facts and circumstances, local, provincial, agricultural, chemical and financial have to be taken into account. This means that each aspect must be properly dealt with by experts before laying down definite lines of action, to guide persons wishing to embark upon those industries. Though it is not practicable to impose such a high standard on the Conference, it cannot indulge in a mere rhetorical display or vague declamation, and the hurrying through a number of Resolutions, is of absolutely no value except where they are intended to emphasize a position laid down after sufficient consideration and discussion. While, therefore, the value of the Papers laid before the Lahore Conference must be acknowledged and the contribution made by the addresses of the President and the Chairman of the Reception Committee and by the speech of His Honor the Lieutenant-Governor to the general treatment of industrial questions is of first class importance, the absence of all discussion of the subjects dealt with by the resolutions has caused great disappointment to all friends of industrial progress. For this regrettable deficiency, the Reception Committee cannot well be blamed. A notable event in connection with this Session of the Industrial Conference was the part which the ruler of the Province, His Honor Sir Louis Danc, the Lieutenant-Governor took in its proceedings. His Honor not only graced the occasion with his presence, but also made a weighty, luminous and sympathetic speech which will be noticed in detail hereafter. The Imperial and Local Governments have often given undeniable proof of their sympathy with the Industrial Conference from the day of its birth and this is the second

time, in the history of that movement, when the head of the Local Government honored it by his visit. But His Honor Sir Louis Dane has made a further advance and given to this organisation his open support and thus added to its weight and strength. The promotion of the Industrial Exhibition, personal interest taken in it, the munificent grants made for it and then the participation in the proceedings of the Industrial Conference, place beyond doubt His Honor's genuine sympathy for the people of this country.

The preliminary arrangements for the Conference were made by a Reception Committee which had for its Chairman, the leading industrialist of the province, Lala Harkishen Lal. He was assisted by a band of zealous and enthusiastic workers, as Secretaries from among whom might be specially mentioned Pandit Balakram Pandya, Prof. S. N. Das Gupta, Prof. Behari Lal Bhatia, Prof. Ruchiram and Mr. Narain Das.

The proceedings were opened by Lala Harkishen Lal, the Chairman of the Reception Committee who in welcoming the delegates delivered an able and inspiring speech. The selection of Mr. Harkishen Lal to the position of Chairman was eminently judicious. He was the right man in the right place. He is the acknowledged pioneer of Joint-stock enterprise in his province. A Cambridge graduate in Mathematics and a practical student of economics, he gave up his practice at the Bar and took up commerce and industrialism as more beneficial to his people. Possessing peculiar fitness for business life, he controls at present no fewer than 19 different companies and associations, among which are the Bharat Insurance Co., Ltd. the People's Bank of India, the Amritsar Bank, the Lahore Spinning and Weaving Mills Co., Ltd. The Bharat Buildings, which accommodated the Congress delegates form one of the sights of Lahore and are a standing monument of his brilliant success in business activities. He was the right-hand man of

the late Sirdar Dayal Singh Majithia, the leading noble man of his time in the Punjab and is the Chairman of the Board of Trustees of Dayal Singh College. He is also one of the trustees of the Lahore "Tribune." As a Chairman of the Indian National Congress and Industrial Conference Reception Committees, he was one of the most prominent members of the Exhibition Committee. He was also a member of the Punjab Legislative Council. The address of such a distinguished citizen and a practical economist and industrialist necessarily commands attention and deserves close study. At the very outset of his address, he makes two suggestions which call for the consideration of the Conference organisation. The first suggestion that, "the future Exhibitions should be attached directly to the Industrial Conference rather than to the Congress," has a good deal to commend it, as the Industrial Conference, is directly concerned with the Industrial activity in the country and has to keep itself abreast of the latest progress in that line. It will, therefore, be more conducive to convenience and real work, if the Industrial Conference organisation—general and provincial—is invited to cooperate with the exhibition committees.

His second suggestion that "Conferences should be held at Easter rather than Christmas to enable the Public to devote more time and attention to economic subjects, than has been hitherto the case," does not appear capable of general acceptance in view of the enormous distances between the different parts of India and the demands on the time of those who take real interest in both the movements.

Dealing with the formative influence of economics, he quotes Professor Marshall to show that "the two great formative agencies of the world's history have been religion and economics," and that "man's character is moulded by his every day work and by the material resources which he thereby procures, more than by other influen-

ces, excepting those of his religious ideals." Politics is but a passing phase. The readjustment of religious ideals, in India necessitated by the advent of the new era began with the work of Ram Mohan Roy. The economic effects of the new surroundings created by the British Rule are mentioned thus :—

' Here the opinions widely differ. The advocates of the cause of the people strenuously urge and maintain that economically India is declining; while the apologists for the British administration with equal zeal assert that India is enjoying a prosperity which she had never known before. The late lamented Romesh Chander Dutt, the first President of the Industrial Conference, whose recent loss to the country we all deplore, asserted that the Truth may lie midway.

Where actually the Truth lies, it is not easy to say, as the problem is not a simple problem' (p. 7).

All the same there is no question as to the extent to which the new economic forces have disturbed the equilibrated society of India.

' The economic relations of the Government and the people have been placed on a new basis, the economic relations of members of families and village communities have altered; the widow, the orphan, the sick, the aged, the indigent, the Brahman, and the Mullah, have now to shift for themselves; places of education, and worship have to be differently maintained; children have to be afforded more expensive bringing up and education; houses have to be more expensively built and furnished; travelling has to be more luxuriously and largely done; manufactures have to be more expensively and elaborately carried out; marketing of agricultural products has to be differently done, mines have to be differently worked. This argument may be extended *ad infinitum*; whether these changes mean prosperity or adversity, need not be tackled here; but that there is an obvious, patent and profound case, for anxiety no one will question.' (pp. 8 & 9).

To the old recognised factors in the production of wealth, *viz.* land, labour, capital, skill, scientific knowledge, training and "the economic man," Mr. Harkishen Lall, adds a *sympathetic state* as a *sine qua non* for the economic development of a community. Though this is not adequately realised in the west, to whichever country we turn our attention, we find that fully 75 per cent. of the time and attention of the state and its assemblies is devoted to economic matters politics as such and social readjustments

take up only 25 per cent. The international competition is everywhere the concern of the state and there is no other agency equally potent and persistent. Without the *Sympathetic state* neither its internal nor external position is capable of timely readjustment and where timely readjustment has not been made the countries and the peoples have sunk. In the west, the State represents the collected will of the people and is, therefore, the embodiment of patriotism. Mr. Harkishen Lall, therefore, expresses the general wish that "conditions in India would so change that the rulers will carry the collected will of the people with them and thereby secure the co-operation of the growing patriotism in the country."

He rightly points out.—

Patriotism is a force. Its applicability to one's country's religious life may be a sweet dream, when applied to politics it is generally exhausted, when *Magna Chartas* are obtained; when applied to social readjustments it amounts to applying really to economic readjustment, to economic, as such, it has not been applied in this country to any appreciable extent, but that it is of great potency can be easily established. It should be directed towards Economic problems and without loss of time. * * Patriotism means wholehearted devotion to one's country and its people—Devotion implies sacrifice, which does not mean suicide, or an annihilation; but the spending of the energies in bettering the condition of the object of devotion. Our energies mean our *time* our *faculties*, our *efforts*, our *money*, and our *influence*. (pp. 10 & 11.)

Referring to the organisation of industries, he touches on the factory and the village-cottage systems and shows the scope and possibilities of each, their relative merits and demerits and gives his opinion that both may exist in a country simultaneously and do immense good in their own way; the village systems being backed up by a system of co-operation. He suggests that the Industrial Conference should classify industries into groups susceptible of the village and the factory systems and otherwise.

In view of the important results which have followed from the application of the principle of co-operation to business finance and to production and distribution of wealth in Europe, he called upon the members of the

Industrial Conference to familiarize the people with the principles and application of co-operation. He justly considers that this may in a measure overcome the difficulties experienced by people in acquiring sufficient capital for their undertakings.

Among questions suggested for consideration by Mr. Harkishen Lall are.

- (1) How to organise capital.
- (2) How to preserve capital, when organised.
- (3) For what objects and under what management should capital be organised.
- (4) If capital be organised as finance, to what extent and under what conditions it should be directed towards the production of wealth.
- (5) Should foreign capital be allowed free scope in State and private undertakings ?
- (6) How could foreign capital be available for private enterprise?

His study of the Franco-British Exhibition of 1908 showed him that climatic conditions or national genius, had very little to do in the preparation of 95 per cent. of the articles manufactured by the advanced countries of the West, and that the best valued articles were those in which land, that is the raw material played lesser part than the labour expended and the capital required for plants was also not prohibitive.

‘These are (he proceeded to point out) conditions favourable to the circumstances of India. But there were certain facts brought home which do not at present exist in India, but which, if effort be directed in that channel, could be easily established. These facts were : knowledge of proportion and designing : power of organisation and agencies for marketing. The message that the Franco-British Exhibition sent to us amounts to this : Don't lose heart ; look up and adapt yourself to altered conditions. There is nothing that nature has denied us ; and nature has not doomed us to live eternally under the law of diversity (p. 13.)

The Conference has been fortunate in securing distinguished personages for its Presidents and the

Maharaja Sir Rameshwar Singh Bahadur of Durbhanga, elected to preside over the Lahore Conference, possessed in addition to his erudition and business capacities, the special distinction of being one of the leading representatives of the aristocracy of Bengal. The Maharaja Bahadur is well-known for his public spirit and munificence and his name is associated with several beneficent movements and important institutions. The Presidential address of the Maharaja can well maintain its position by the side of the utterances of his predecessors and is interspersed with practical suggestions, deserving of a careful study by all interested in the industrial regeneration of their mother country. The address covers a wide range of topics and takes a practical Survey of the industrial situation of India, with an eloquent appeal for mutual trust and harmonious co-operation on the part of all communities inhabiting this Peninsula.

The Maharaja exhorts his countrymen not to be impatient to "reach a goal without going through the intermediate disciplinary stages" for nation-building to be of a permanent order, is necessarily a very slow evolutionary process. "We must be content," says he, "to do the work that is before us, in our lifetime to carry on the torch in our own day and pass it with undiminished lustre to our successors in the race." He lays special stress also on the fact that nation-building to be of a lasting character requires the co-operation of all the sections of the community and is glad to notice that a feeling of good fellowship is beginning to manifest itself largely between Hindus and Mahomedans. Says he :—

We can be—"distinct as the billows,
yet one as the sea."

'Differences in religions, creeds and rituals there will always be amongst us, but these need not interfere with entire community of feeling and co-operative unity of spirit in promoting the material, social, intellectual, political and moral progress of India. (p. 16)

In his survey of industrial problems, he insists upon the importance of agriculture, as the first and foremost of all Indian industries. In regard to this he remarks :—

‘The soil is not made to yield forth the abundance she is capable of doing, and the consequence is that there are still millions of the inhabitants who do not have enough to eat all the year round, and in years of drought and famine we all know the misery that ensues notwithstanding the splendid efforts of the Government and the land-owners to assuage and stem the tide of starvation and death at such times. Agriculture is receiving the serious attention of our Government. Agricultural Colleges and Government Farms planted here and there have been doing fruitfull work so far as they are able ; but there are not enough of them yet to do more than touch the fringe of the subject. My conviction is that scientific agriculture must begin to be taught and learned at all the primary schools in India, every pupil being practically instructed by means of gardens being attached to each school. I observe that this is also the opinion of Mr. F. Smith, the able Deputy Director of Agriculture in Bengal who has just published a little brochure on the subject, which all interested in the teaching of agriculture should procure and read. It was Jonathan Swift who said “that whoever could make two ears of corn, or two blades of grass, to grow upon a spot of ground where only one grew before, would deserve better of mankind, and do more essential service to his country, than the whole race of politicians put together.”’ (pp. 16 & 17.)

In support of his contention, he cites the instance of the jute crop which, if scientifically cultivated would yield an additional annual wealth to the two Bengals of at least 24 crores. The Maharaja next touches on “the yet unexploited wealth to be obtained from the sea,” and indicates the vast scope which exists for the expansion of an important industry, which bids fair to be a useful source of food supply to large masses of the population and opens out a new channel of increasing the material prosperity. Adds he :—

‘Fishing brings quite a number of related industries in its train. The manufacture of oil which would find a ready sale ; the curing trade, the making of barrels and packing cases, &c., &c., beside furnishing employment to thousands as merchants and vendors of fish and its products, and ultimately as a Swadeshi industry, the building of steam trawlers with all their equipments, and outfits of tackle and apparatus’ (p. 18)

From fisheries, he passes on to the Textile industries and taking a rapid survey of that industry which has progressed with strides in recent years and calls attention to the great scope for the expansion of the Jute industry which is now entirely in the hands of European firms.

‘Would it not now be possible for Swadeshi enterprise to take part in such an industry? I think there is ample room for such.’ The fibre itself is practically the monopoly of Bengal and good profits are steadily earned by well-managed concerns.’ (p. 19)

Coal industry was next dealt with. “Our coal stores under-ground are of a practically inexhaustible nature” and no time should be lost in educating the youths of the country to specialise in the Department in which each is fitted for the exploitation of the mineral wealth of the country, including iron, manganese, mineral oil, etc.

In regard to technical education his views may be thus stated:—

‘We have already technical schools and colleges here for the training of young men in a scientific manner for those pursuits where brains and skill are required, but these educational establishments will have to be multiplied manifold if we are to hold our own in the race of industrial competition and I would counsel all parents and guardians who have the means to give the heartiest encouragement in their own spheres of influence, to that technical education, without which their sons will be of little use in taking a grip of the professions and industries by means of which we hope to work out the commercial and industrial salvation of India.’

‘Chemists and electrical engineers are wanted in India and these are professions eminently suited for educated young men. The time is at hand when every considerable engineering and textile work will have an expert chemist on their staff, and as for applied Electricity, the vision before us is one of incalculable progress in every sphere of life; in household economy, in municipal life, in inter-communication, in lighting and in motive power. We seem to be as yet on the threshold of our endeavours to harness electricity to the wants of man, and almost every month new discoveries are being made. There is bound to be a wide field in India in the near future for electrical engineers and electrical work of all kinds, and our educational establishments should lay themselves out more and to equip men for coping, with this great enterprise.’ (pp. 19 and 20).

The Maharaja next pointed out the importance of utilising the power of wind and water for driving motors, as it is hardly touched in this country, citing the example of the United States of America, where farmers use cheap wind mills of their own construction and these mills do nearly all the farm-work from the pumping of the water to the winnowing of grain.

For small industries, such as the making of delicate and hand-made fabrics, indigenous art-wares in metal, carvings, miniature paintings on ivory, &c., there is a great demand in foreign countries and these industries, therefore, require to be revived on proper basis. Although exhibitions have done a great deal in showing what India can do, much more could be done with the help of the department of Commerce and Industry. The Maharaja suggests that arrangements should be made to have small museums of our artware and other products, attached to the British Consulates in foreign countries with catalogues. This is an excellent suggestion and deserves to be taken up in right earnest as it is sure to give a great impetus to our productions.

'There are a great many goods which we still import that can in due time be made by ourselves. And why should we export such products as cotton seed, when we could export the extracted oil, and enrich the land with the refuse?' (p.22.)

With passing allusion to a federation of sugar growers in India, which was to be shortly instituted, the President proceeded to record his views on the question of the standardization of weights and measures, a subject which was noticed also by His Honor Sir Louis Dane. The Maharaja suggests :—

'It might serve a good purpose if this Conference were to appoint a small select committee to consider the whole question of standardisation and to report at the meeting of the Conference next year what in their opinion ought to be the best means of gaining the end in view. At present it seems to be almost as difficult to get a people to change their weights and measures into a Universal Standard as it would be to get them to change their language.' (p. 23).

The Maharaja has great faith in the Swadeshi as freed from the somewhat bitter accretions which have of late clung to it. "It simply means our wholehearted purpose of doing all we can to foster and develop by all the means in our power the resources of our country." Says the Maharaja :—

'We have the brains, the capital, and the enterprise required for going along on safe lines. And we have the growing national spirit which will produce brotherly, helpful and sympathetic co-operation amongst all classes of the community. For without these things we labour in vain.' (p. 24).

He concluded the address with a brilliant peroration, which ought to be deeply pondered over and acted upon by men of all communities in India, as it is full of extremely sound and sagacious advice. We quote a couple of passages from it :

'Ladies and Gentlemen, India is peopled with many races and communities. Their religious and ethnological characteristics, their traditions and commercial pre-disposition and their adherence to rooted convictions need not cause any anxiety to the advocate of industrial enterprise in our country. Commercial and industrial co-operation is not inconsistent with the preservation of the religious persuasions existing amongst us. The keynote of success in trade and industry is the adjustment of commercial relations of all classes without regard to religion or race. A united effort to secure the greatest possible material prosperity in the land is honourable labour for the Mahomedan and the Hindu alike and for the official and non-official equally'. (p. 26).

'The vision of United India will ever remain an abstraction if the two greatest communities in the land did not step up to a common platform of cordial co-operation and close comradeship. As an agency of unification territorial patriotism is great and potent. Light this sacred fire in every Indian heart without consideration of race and creed; and where more fitting to burn the incense of a nation's devotion than the sphere of commerce and industry. We want India to be a country of happy homes and of a loyal and contented people.' (p. 26).

After the presidential address, came a thoughtful and kindly speech from His Honor Sir Louis Dane, delivered with the grace and felicity so well-known. As His Honor had only a few days previously expressed his views on Indian Industrial problems, when opening the Lahore Exhibition (*Vide* appendix I to this Report) he contented

himself in his short yet instructive speech at the Conference, with pointing out the possibilities of industrial development in the Punjab, Kashmere and the adacent provinces.

'I have already ventured to say that in the Punjab with its enormous areas that have recently been brought under cultivation and with its comparatively scanty population as compared with other Provinces in India, there is already a field awaiting development of the greatest possible potentialities. We produce already an enormous surplus of raw agricultural products, but those agricultural products unfortunately leave the country and it is my earnest desire and I hope it is the desire of all of you that we should do something to enable us to work up those agricultural products in the country itself and so enrich all classes of the community. (*Cheers*).' (p. 28).

His Honor next dealt with the question of the standardization of weights and measures to which he attaches great importance and emphasised the suggestion of the Maharaja of Darbhanga "to appoint a committee to further consider this subject and bring it prominently to the notice of the public." The remarks of Sir Louis on this subject can hardly be improved upon and we make no apology for reproducing them for the benefit of our readers :—

'The Maharaja Bahadur has referred to the question of the standardization of weights and measures. You all know, gentlemen, that this is one of the most important problems which lies before the commercial development of this country. But perhaps some of you may have forgotten, as you are not as old as myself, that the Government of India had already taken steps in this direction and a good many years ago passed an Act for the regularisation of weights and measures. It so happens that a *seer* is almost exactly the same weight as the French *Kilogramme*, that is, thousand grams, which is the basis of the system of weights that prevails over most of the civilised countries of the world, and the Act exists upon the statute book of the Government of India which has to make a *seer* the same as a *Kilogramme* with the view of introducing that system of weights.' (pp. 28 & 29).

'The Government of India have recognised the extreme desirability of making our *seer* equal to a *Kilogramme* with a view to adopt that standard of weights.' (p. 29)

His Honor then discussed the relative advantages of Village systems and the extension of the Factory system. "The Punjab," said His Honor, "is very proud of its

village communities, which still exist in a stronger form in the province than anywhere else in the country and anything that would strengthen that system would meet with the approval and support of Government."

The usual presentation of the annual report of the conference was the next business. In the unavoidable absence of the General Secretary owing to unexpected difficulties, this duty was performed by Mr. C. Y. Chintamani, who moved the adoption of the report in a neat speech.

The number of papers laid on the table was this year larger than in any of the preceding years, covering a wide range of very important themes, among the contributors being many experts and officials holding high and responsible posts under Government.

Without being open to the charge of making invivious distinctions, the place of honor may appropriately be given to the paper on "combination" contributed by Mr. Frederick Noel Paton the Director-General of Commercial Intelligence Department. As a distinguished representative of Government with wide and varied experience and commanding special facilities for the study of Industrial problems of India, he has pointed out the importance of combination as the basis of industrial activity. Citing the Joint Stock Company as the most familiar form of "combination" he proceeds to observe that "many Indian projects and enterprises miscarry through neglect to provide sufficiently for this principle of reciprocal limitation or through consciousness on the part of persons disposed to participate, that they do not know how to secure effective observance of it. In his opinion, various other forms of combination different from the mere Joint Stock Company, suitable to the requirements of each industry are essential for ultimate success. To quote Mr. Noel Paton—

'A simple example is that of combination among exporters of Indian yarns, designed to secure and maintain a larger and more constant

control of a particular foreign market. We have seen more than once Indian spinners individually make good a position in a foreign market, build up a connection and establish a reputation in the bazaars for their tickets or *chaps*. Again and again we have seen them abandon the market so far conquered and turn their attention exclusively to an opening that had, through temporary causes, arisen in an entirely opposite direction. The new opening may prove to be as shortlived as the first; and before long we see all the shippers of twist hastening back to the market they had forsaken and beginning afresh the task of building up a trade. Some of these fickle spinners are surprised to find, on their return, that their tickets have already been forgotten or have been displaced by the tickets and products of competitors from other countries, who have marked and reckoned on the volatile methods of Hindustan. Others accept as inevitable the law that no shipper or manufacturer can escape the evil consequences of playing fast and loose with a market.' (pp. 35 & 36.)

The author exhorts the Indian Spinners and other traders to combine not only in the marketing of a finished product but also in "the conduct of manufactures and in the procuring and producing of raw materials." "The man," he exclaims, "who can bring about a combination of this kind will have done a great deal more for India than by appearing on a hundred platforms and reading a hundred dull papers," after duly taking into consideration the factor of supervision and control.

The specific suggestions of Mr. Noel Paton may be summarized in his own words as given below :—

SPINNING INDUSTRIES.

'In the meantime I may briefly indicate the method adopted by our competitors. It is that a group of spinners and shippers who are in a position to turn out a uniform range of yarns combine. They adopt one set of tickets and syndicate their interests in these tickets in such proportions as they think fit. For instance there may be two spinners each holding a quarter share in the syndicate and two other spinners holding shares respectively of one-fifth and of three-tenths. The syndicate may agree from time to time what quantity of yarn is to be shipped to a given market; and each of the three participants is under an obligation to contribute his quota at the price agreed upon.' (p. 38.)

COTTON SEED INDUSTRY

'In this country cotton-seed oil will find its best market in the form of what are called edibles—ghi substitutes and oils for cooking and here

here the characteristic Indian scruples about fatty matter of unknown origin protect us from foreign competition without raising any awkward tariff question. But, in the first place, the stearines that constitute the butterlike extract form only a small percentage of the oil from which they are obtained. In the second place, the processes of refining demand expert management and a relatively costly plant. It follows from the first premise that a very large volume of crude oil must be treated to obtain such a quantity of butter substitute as could furnish the basis of a considerable trade. If the establishment that conducts the refining processes is also to crush the seed and make the crude oil, then vast quantities of seed must be brought to it. It will first have to pay inward freight on that seed and will thereafter probably have to pay outward freight on the cake. The cake represents the bulk of the material and would have to be re-distributed to centres where there existed a demand for fodder and manure. A third form of waste would attend this procedure inasmuch as it would afford no employment for the motive power now latent in those ginnery engines which stand unused during a large part of the year. All these difficulties are, overcome if the crushing is done at the ginneries and if only the crude oil is sent to the refinery the cake remaining in those places where the crops are to be manured and where large numbers of cattle are maintained both for cultivation and for transport.' (pp. 40 & 41)

The author next proceeds to consider and diagnose the causes of the rapid decadence of sugar Industry in India. His suggestions on the methods of reviving this important national industry being eminently sound and practical, will amply repay a careful perusal:—

'For myself I am convinced that the principal reason lies in India's characteristic disregard of theory--her failure to ascertain and define the principles by which competing countries regulate their action, and to recognise in clear terms the overwhelming contrast that exists between the conditions that have been laboriously brought about in those countries and the conditions which India herself allows to survive year after year in blindness to the lessons plainly set before her.' (p. 46).

* * * 'Centralization has been and is increasingly the keynote of all successful enterprise in the modern cane sugar industry, and that centralization in this connection has a somewhat special meaning. It means not only the replacing of numerous small appliances by relatively few establishments of sufficient size to insure economical working and to support the cost of expert supervision, It means still more; the concentration of the cane fields in the immediate vicinity of the factory. * * *

* * * * The sucrose in cane that has been cut undergoes rapid chemical change ; and unless the cane is taken to the mills in a short time a large part of the potential sugar is lost. When I say a large

part I mean so large a part as to prevent from the very beginning any hope of profit on a truly competitive-basis,' (pp. 46 & 47)

The author urges on the adoption of the principles of combination with regard to other industries as well.

In every country the present tendency is decidedly towards factories on a large scale and if "India" says he, "is to take a hand in the game she must conform to the rules."

In conclusion Mr. Noel Paton suggests that the details of the organisation, proper to each separate industry should be worked out as distinct problems and considered link by link and that the meetings of the Industrial Conferences would be more fruitful, if one or two specific subjects were prescribed for each year and arrangements made for a symposium of opinions from all the several provinces of India.

Two papers bearing on the possibility of development of "Fisheries" have been contributed by two Government Officials of that Department. Sir Frederick Nicholson, K. C. I. E., Honorary Director, Government Fisheries, Madras, writes on the "Marine Fisheries of the Madras Presidency" and Mr. S. N. Das, Assistant to the Commissioner of Fisheries, Bengal, on "the Bengal Fisheries."

Sir F. Nicholson, indicates in a convincing manner the vast potentialities of the Fishing trade along an extensive coast line of some 1700 miles, in the Madras Presidency. After describing the primitive condition of that industry, the catamaran boats, fishing within an area of 5 or 6 miles up to 6 to 8 fathoms in depth, with comparatively miserable nets, with curing methods as defective and crude as the fishing apparatus, he passes on to describe the modern ideas and necessities with regard to that trade.

In the first place, public hygiene demands in the interest of the individual and the community that the food supply must be of the best and safest quality to satisfy the most fastidious taste and sufficiently plentiful to meet

the ever-growing demands of an increasing population. Fish is also very valuable as a field manure, large quantities of fish which are at present, allowed to rot along coast lines can be very well utilized as fertilisers of the soil. To improve the existing industry with its concomitant bye-industries in a way to enrich and wholesomely, feed the greatest possible number of people and add the harvest of the sea to the harvest of the soil, is the goal of experimental stations started by the Madras Government. The following reforms are being tried at these stations :—

(1) The introduction of live cars and live chests or pens, so that fish can be brought alive to the shore and kept in good condition till required.

(2) Fish not kept alive must be cleaned and washed at sea and properly stored.

(3) Fish intended for food, should be so treated subsequently that its freshness may be preserved for a longer time than usual.

(4) Fish must be taken at once to the curing yards where cleanliness must be an absolute rule.

(5) Rapidity of operation is in many cases necessary, so that fish brought in the early morning may be salted, dried and smoked by the evening.

(6) Pickled fish is under trial and plant has been obtained for carrying on experiments in canning.

Another method of increasing food supply by pisciculture, can be tried only in the inland (fresh) waters with the exception of the culture of the shell fish *e. g.*, oyster, and mussels.

In conclusion the author points out :—

“ Be it remembered that if we take the present annual catches in this (Madras) Presidency roughly at 150,000 tons of edible fish, this is but one-seventh of the British catches for a similar population ; that the addition of only 100,000 tons would mean additional edible rations of something like 180 million pounds, or nearly 4·5 lb. per head for every man, woman, and child in the Presidency, an appreciable addition to the food of the meat-eating population, while there would also be 20,000 tons of offal, etc. for conversion into manure ; the whole

of this mass of food and fertiliser would be pure gain to the country and especially to the working classes, while various by-industries which there has been no space to discuss, would accompany the development ; such industries are those which relate to boat building, machinery, the pressing and refining of edible vegetable oils, the production of vinegar, pottery, refrigeration, co-opering, pearl button making, tin plate working, etc., to say nothing of increased traffic and business dealings.' (pp. 76 & 77.)

Paper of Mr. S. N. Das deserves to be read along with that of Sir F. Nicholson. Mr. Das divides the work undertaken by the Fishery Inquiry Office into 3 main heads in the order of their importance so far as Bengal is concerned *viz* :—

(1) Freshwater Fisheries, (2) Estuarine Fisheries, (3) Deep Sea fisheries. Mr. Das appears to possess expert knowledge of the subject he deals with and the information he has collected will be found very useful. He gives the different varieties of fish, which reside in fresh water and suggests methods for remedying the defective supply by re-excavation of the old tanks and in other ways and recommends the starting of carpiculture stations for the artificial propagation of the fish with the co-operation of Government.

He recommends the cultivation of the *Haplochilus* who have a peculiar and natural propensity for eating up the larvæ of the malaria-producing mosquito.

Estuarine Fisheries—The yield of the vast tracts of the Sunderbans is proverbial. The European nets being designed for English waters, country nets are found on practical tests, to be better suited to the Sunderban fisheries. Motor boats fitted with refrigerators might, however, be employed with advantage for working more distant tracts and localities of fish. A company may be floated to work the fisheries on these lines, which are sure to be successful. The experiments conducted by Government in the Bay of Bengal go to prove that there are extensive fishing possibilities in the Bay and that with the aid of improved appliances fish can be

brought to the market, in quite fresh condition, the coarse or inferior fish being converted into manure.

We now come to the excellent and inspiring paper of Dr. T. H. D. LaTouche of the Geological Survey of India on "Mining in India, past and future." The paper is replete with sound and practical suggestions, which fully deserve to be carried out and is couched in the most sympathetic language, which clearly reveals the author's genuine desire to see the revival in India of this important national industry. Dr. LaTouche takes a brief historical review of the past mining activity in the country and proves that "in all parts of India, wherever useful and valuable ores occur, traces of former activity both in extracting ores from the rocks and in smelting and fashioning the metals derived from them, are to be met with." To show how widespread were the mining operations in ancient times, he mentions a few specific instances :—

(1) The existence of old workings in the auriferous tracts for extracting gold in Dharwar District, the Hatti mines in H. H. the Nizam's dominions and in Chota Nagpur. In many of these places even the vaguest traditions of the ancient workings have died out.

(2) In copper belt of Singbhum for a distance of at least 80 miles.

(3) Copper, silver and lead mines of, Kumaon and Kulu.

(4) Traces of old workings in Kashmir, Rajputana, etc.

(5) Iron smelting in the Central Provinces and the washing of gold dust from the river Alluvium.

"It is hardly possible," says the writer, "to travel through any of the hilly tracts of the country without coming across traces of this former activity." Adds he:—

'Of metallurgical processes also, although of as rude a type as their methods of extracting and treating the ores, the ancients were by no means without knowledge. The most conspicuous instance of such knowledge is perhaps the manufacture of the famous *wool* or steel of

Southern India. For centuries this material was in demand over the whole of the civilised world, and as Mr. Ball remarks in his *Manual of the Economic Geology of India* (p. 340), "The famous Damascus blades had long attained a reputation for flexibility, strength and beauty before it was known that the material from which they were made was produced in an obscure Indian village, and that traders from Persia found that it paid them to travel to this place, which was difficult of access, in order to obtain the raw material."....."There are reasons for believing that *woot*: was exported to the west in very early times—possibly 2,000 years ago". Not only was steel thus produced in Southern India for many ages, but Sir Thomas Holland has shown (*Records, G. S. I., Vol. XXV, p. 147*) that two distinct processes of manufacture had been devised by the natives, both of them afterwards imitated and improved upon by steel makers in Europe. One of these was the carburisation of wrought iron in crucibles, a principle not applied in England till the year 1800, when it led to the great development of steel-making for the manufacture of the celebrated Sheffield cutlery; but the other is almost more interesting, for in the Salem District Sir Thomas Holland found steel being made by the *decarburisation* of cast iron, thus anticipating by ages the latest developments of steel-making processes, the Bessemer and open-hearth methods.' (p. 79)

As another instance of the anticipation of modern methods, the author cites the manufacture of iron in the Khasi Hills of Assam, where the ore occurs in the form of almost microscopic particles disseminated through a granite from which it is separated by crude process of Hydraulic mining. His encomiums of the modes of the native miners may be given in his own words :—

'In the west it is only within recent years that means have been devised for obtaining such fine particles of ore, which is of great purity and therefore of high value, from this class of rocks. Yet here we have the Khasis, an aboriginal tribe, using a practical method of extracting such ore for ages, and turning out a product of such excellent quality that at one time it was proposed to start smelting works on a large scale in that country.' (p. 80)

In the opinion of the author, the decline of the native mining and metallurgical industry is due to the overwhelming competition imported metals from Europe and America where "a single blast furnace will turn out hundreds of tons of iron while the native furnace is only producing a few sheers." The difficulty of supply of charcoal has seriously hampered the smelting by native

methods. The extinction of the smelting industry is largely due also to the apathy and greed of the well-to-do classes.

His exhortations to Indians to revive this industry, and to realise the dignity of manual labour are very stirring and his trenchant attacks on the general lethargy ought to arouse our countrymen to a sense of their duty and to shake off the torpor of ages :—

‘ No one will deny that India has produced in the past, and is still able to produce, men whose intellects are as acute as any that are to be found in the western world.’

‘ Yet it is almost inconceivable that, among so many generations of workers, one man here and there did not arise with glimmering idea’ of improvement, which, if fostered, might have led to great results. (p. 81.)

* * * *

‘ Are you content merely to receive such a share of the profits as is derived from investments in mining and manufacturing concerns, a poor way of making money at best, looking on while your country is being depleted of the raw material with which Nature has so bountifully supplied you, and compelled to pay highly for the metals which might be very largely extracted from your own mines, and for the articles manufactured from them?’ (p. 82.)

* * * *

‘Is it now too late for a revival of the native industry to be effected? Such a revival would entail an entire reversal of the aspect with which manual labour, except to a small extent agricultural labour, is regarded by the educated classes, the aristocracy of this country. And yet it is not impossible that such a revolution in ideas, a much more worthy object, though even more difficult of attainment, than a political revolution, might be brought about.’ (p. 83.)

The author then proceeds to narrate an interesting account of a visit that he once paid to one of the ship-building magnates in the North of Ireland. While he was admiring the evidences of great wealth and culture around him, the door of the room opened and “ what I can describe” says he, “as a grimy apparition appeared—a figure blackened with oil and coal dust, bearing every mark of strenuous labor, this if you please, was the son of the house, employed not in spending his father’s

wealth or in superintending his workmen, but as one of the meanest of them, learning by the sweat of his brow to file a piece of brass to a true surface."

Are Indian youths prepared for such strenuous work, to forget the behests of false fashion or racial pride? Unless they realise the dignity of manual work, there is not the remotest chance of industrial regeneration for centuries to come.

With this paper may be read with interest, the contribution of Mr. Thakursingh on "The mining and mineral problems." Mr. Thakursingh gives some instructive statistics in connection with mining leases to show that the mining industry of India is almost entirely in the hands of foreign capitalists, "which from an Indian point of view may be regarded as a national calamity." There is a wrong impression in the minds of the people of India that mining operations involve a serious responsibility and that there is no use in sending students to foreign countries to learn mining and allied subjects unless there are mines owned by our capitalists and managed by our own Directors. The revival of this industry cannot be effected without complete mutual trust and combination. The author expresses a hope that European firms also will join hands with Indian Syndicates and suggests the establishment of two mining schools one for coal and the other for metal mining.

We next come to a set of papers contributed by Superintendents or Principals of three Art Schools. These papers may aptly be grouped together for the sake of convenience. "Teaching in Indian Art Schools" is the theme of the paper of Mr. W.S. Hadaway, the Superintendent of the School of Arts, Madras. Mr. Hadaway describes by way of comparison the methods followed in other countries for teaching arts. The *first* is a painting school, where painting, drawing and occasionally model-

ling are taught with a view to produce picture painters or sculptors. The *second* is the arts and crafts school for teaching every variety of artistic work, e.g. wood carving, ornamental metal work, embroidery, enamelling etc., lastly the evening schools for preparing students in arts and crafts, drawing and painting. In the first school, the student has to learn everything by his own observation and comparison of his work with that of other students more or less advanced. Mr. Hadaway pointedly draws the attention to the fact that teaching in art (by showing the faults in the work of a student with instructions to avoid them in future) as is to be seen in Indian art schools is practically unknown in England and hence a student there has to depend on his own perseverance and has to struggle hard for success.

The author is in favor of schools run on the workshop model, where students work under a practical workman and continually see before them a skilled artist executing some fine design.

Sardar Bahadur Ramsing, Principal, Mayo Art School writes a short paper on "Wood carving in the Punjab". He traces the vicissitudes through which the art of wood carving has passed and shows how it was influenced by Persian and other non-Hindu styles. Wood carving appears to have been practised in India from immemorial ages, one evidence of which is that in Hindu houses entrance doors, have always been prepared with great care and labour and at a great cost of time and energy. In some cases workmen used to be set to make them nearly two years before the building itself commenced. Before the time of Akbar, the style practised was distinctly Hindu. In the reign of Akbar, the Akbari style, being a mixture of the Hindu and Persian Styles came into vogue in the Punjab. The author then points out how wood carving gradually came to be neglected, its revival in the Punjab being largely due to the establishment of

the Mayo School of Arts, Lahore. This art school has turned out trained artisans and has improved the general tone of their work.

The third paper in this group has been contributed by Mr. Percy Brown, Principal, Government School of Arts, Calcutta. Mr. P. Brown is apprehensive that the present general desire for extreme commercialism may lead to the extinction of a very valuable trait as regards the well-established artistic instincts in almost every Indian community. To check this decay should be the aim of every Indian.

The Principal next attempts to correct the modern impression that "Bengal is not a particularly artistic portion for the country." In support of this view he cites the instance of the splendid ruins of Patna, the ancient Pataliputra, Dacca, Budh Gaya, Puri and other places, to show that Bengal was not behind other provinces in this matter.

Turning to the industrial arts, the Principal allots the first place to the Muslims of Dacca which are still coveted by customers from the East and West. He calls special attention to the Orissa Art Union of Cuttack started on sound commercial basis.

We now pass on to Mr. J. E. O'Connor's paper on "Industrial Development of India." In the order of importance, he assigns the first place to agriculture, as 'more than two-thirds of the Indian population are dependent upon land.' This industry in the opinion of the writer is largely handicapped. Mr. O'Connor knows well the subject he deals with and without attempting to improve upon his remarks for fear of marring their effect, we make no apology in quoting them for the enlightenment of our readers :—

'It is more to the purpose to consider whether our system of land taxation is capable of justification when judged by the principles of Western Economics, and when this comparison is made there is no doubt about the answer. It may be that we are not taking more from the cultivator

by way of taxation than 25, or 20, 10 per cent., where former rulers took 50 per cent., but it seems to me that even the figure of 10 per cent. would be regarded as excessive and restrictive if it were applied to the customs duties or the income tax, and it is certainly excessive when applied to the land. I have raised this point before, and was met in the *Pioneer* by the jeer that if the Government demand on the land were reduced, the money left to the cultivator would be wasted on wedding feasts. The jeer reminded me of the barbarous justification of the imposition of excessive rents by the Irish landlords : "the best manure for the farm is to salt the land with a high rent." The journal which pronounced its brawling judgment on my proposition frequently fills its columns with dissertations on the indebtedness of the cultivator and on the existence of vast buried hoards all over India. Now, if the cultivator spends his money on marriage, festivities and would so spend more if he had it to spend, and if he is so hopelessly indebted as is stated, where do all these vast hoards come from ? I have no doubt myself that the hoards are mythical and that in the main the population dependent on the land lives from hand to mouth and has no money to hoard. The relevancy of this matter to discussions on the industrial development of India lies in this consideration ; with two-thirds of the whole population living in such a condition where are you to find an adequate market and an expanding demand for manufactures which will accompany industrial development ?' (pp. 95 & 96).

Until the condition of the agricultural population (he urges) is materially improved, industrial development in India must be necessarily slow, insecure and discouraging. For the purpose of reducing land taxation, land should be subjected to the same rate of taxation as any other commodity. Knowledge of intensive culture should be given to the farmers and scientific principles of different processes explained to them, and Agricultural Banks started to meet the deficiency of capital.

With regard to manufacturing industries, Mr. O'Connor sounds a note of warning that industries conducted on a small scale and by hand power are of little use to-day and it is not desirable to encourage their multiplication, as they cannot stand competition with factory-made goods.

After paying a high compliment to the enlightened communities of Bombay—Hindu, Parsee, Mahomedan—who have set a splendid example to the rest of India in regard to the industrial acumen and enterprise, he dilates

to some extent on the need of Technical education, not only to the artisan classes but to the younger members of families of good social status who should learn the best methods of running a large factory. Says he :—

‘Technical Schools and Colleges are wanted, and as usual the tendency is to look to the state to supply them. Let me recommend however, that the community should found them and should be content with grants-in aid from the State. The late Mr. Tata of Bombay gave a noble example of how such things should be done, and I wish that there were even ten other men like him, patriotic, independent, far-seeing and splendidly public-spirited, ready to do something like what he did.’ (p. 100)

In the opinion of this writer there is a wide field in India for the following industries:—

(1) Extension of cotton manufacture, there being room in India for ten times the number of mills now existing.

(2) Tools and apparatus.

(3) Ploughshares, hoes and kurpi.

(4) Metal utensils.

(5) Leather articles required by the mass of the people.

(6) Earthenware.

(7) Sugar.

The next paper in this group is contributed by Dr. Alfred Hay, D. Sc. M. I. E., Professor of Electrical Technology, at the Indian Institute of Science, Bangalore, on “Industrial development and electric power transmission.” Dr. Hay begins his paper with an allusion to the present intense intellectual activity as displayed in the study of nature and application of Science to minister to the happiness and comfort of the well-to-do classes, if not of the whole human race. “The standard of life,” says he “is immensely higher than it was a few centuries ago.” The science of Electricity has played a very important part in bringing about the present gigantic development of industries and commerce.

In his opinion, the following causes have contributed a great deal to the achievements of modern industry :—

- (a) Introduction of automatic tools and machinery.
- (b) Perfection of methods of measurement and consequent precision of machine tool work and manufacture of interchangeable parts.
- (c) Discovery of new and valuable industrial products.
- (d) Inventions of new processes and methods.
- (e) Development of cheap power generation and distribution.

The author proceeds to show the importance of electricity as the only cheap agent for power transmission destined to play an important part in the future industrial expansion. He bases his conclusions on the following premises which may be given in his own words :—

‘All sources of energy may be divided into two great classes : (1) those which represent accumulations of energy gradually formed under the action of the Sun's light and heat in the course of countless ages and which, when once exhausted, cannot be replaced. To this class belong the important fuels represented by the different varieties of coal, peat, mineral oils and natural gas; (2) those which are being replenished by the Sun's action as fast as they are utilised. To the second class belong water-falls, tides, winds, and the various forms of fuel derived from growing vegetation. The distinction between these two classes is a vital one. For so long as we depend on the first class—which is very largely the case at the present time—We are exhausting supplies of energy which are sooner or later bound to come to an end. We are depleting the world of its reserves of energy and depriving future generations of all the advantages connected with the possession of such reserve stores; while in drawing our power supply from any source belonging to the second class, we have the comforting assurance that we are not playing the part of spendthrifts, but are merely utilising energy at a rate not in excess of that at which Nature is able to supply us with it.’ (pp. 111 & 112)

Apart from this, there are some aspects of electric power which undoubtedly establish its superiority over steam. Dr. Hay observes :—

‘No one who has experienced the depressing effect of a manufacturing town of the old type—with its countless chimneys belching forth smoke and poisoning the atmosphere for miles around, rendering everything grimy and suggestive of poverty, squalor and misery,—can

fail to feel a deep sympathy for the workers who are doomed to pass their entire lives in such dismal and uncongenial surroundings. If with this we compare the cleanliness, comfort, and cheerful aspect of a manufacturing centre which is supplied with electric power, the contrast will point its own moral.' (p. 116).

With Dr. Hay's paper may be read "A few words about electrical development" by Mr. Shiv Narayan, in which he points out that the Punjab or the Land of the five Rivers is eminently fitted for hydro-electrical development. He advises his countrymen to follow the example of the United States and utilize the waterfalls for driving electric motors, which can be applied to innumerable uses.

We now come to Mr. Tellery's paper on the "Problem of indigenous workmen and indigenous art." Mr. Tellery has been taking an active interest in the work of the Industrial Conference, and has the following important suggestions to make :—

'We should establish the Indian industrial development society with head-quarters either in *Bombay* or *Calcutta* and branches in every province with sub-agencies in every city. The Head office should be in a position to provide every kind of information, the branches might require for the development of indigenous industry and in establishing new industries, the work of the provincial branches should be to be in communication with the people and put before them proposals and some ideas in which way certain industries should be carried out and if developed what machinery and what expenses would be incurred and also what profit could be made out of them. The chief aim must be to form companies and if companies are floated people will take a larger interest in the work than if such concerns are financed by single persons.

The branches and head office should also help the manufacturer to find in market for his goods and also be helpful to him in other ways'.

* * * * *

'As we have not the men to carry out this work with up-to-date machinery and with a profit, we are obliged to import good trained and reliable men, who would train our workmen to perfection in the new arts of the west and so put us on a footing to be able to compete with imported ware. Further, it would be advisable if the society would be the right hand of the Indian Industrial Conference and through whom the Conference would be in a position to verify all the information necessary to be put before the General Meeting which requires to be brought before the general public or the Government.' (pp. 301 & 302)

'An annual report of the working of the Society should also be put before the General Meeting of the Indian Industrial Conference for the information of the public and the members of the Committee.' (p. 302).

That technical, commercial and industrial education has begun to attract an increasing share of public attention will be evident from the four papers submitted to the Lahore Conference. The papers deal with the various aspects of the subject and deserve very careful and attentive perusal. In this series, the place of honor may justly be assigned to the paper on "Industrial and Commercial Education as factors in national and international progress" by Rev. T. C. Badley, Manager, Department of Commercial Education, Reid, Christian College, Lucknow. The subject has been very ably handled by Rev. Badley, and his paper deserves to be carefully studied by all, who are interested in the industrial regeneration through the medium of technical education. We are sorry, the limited compass of an introduction precludes the possibility of any attempt to do even a scant justice to its solid contents. Rev. Badley defines commercial and technical education thus :—

'Commercial and Industrial Education, is that technical training, which on the one hand enables a man to comprehend the complex problems presented in the manipulation of the world's commerce and industry and on the other puts him in possession of the specialized training which not only explains the machinery by which it is carried on, but provides him with the skill necessary to alter or improve that machinery.'

'National progress is the measure of that virility in the people and institutions of a country which makes for their increased welfare and enables them to meet their needs. International progress is the measure of a nation's influence in the councils of other nations, which is exercised by virtue of her national resources and strategical power.' (p. 149.)

With these simple yet accurate definitions the author lays stress on the axiom that "no nation can rise higher than the average of its citizens," the worth of each citizen being measured by his ability to add to the state's fund of

knowledge or physical wellbeing. The citizen who does not produce something for the nation is a dead weight that "hinders its progress and drains its vitality." The only way to increase the efficiency of an average citizen is through industrial and commercial education. The author quotes profusely from the admirable essay on "industrial education" by Dr. H. S. Person, Ph. D. wherein the illustrious author gives the result of his study of German educational systems and the secret of her phenomenal success, within a comparatively very short period:—

'Germany is one of the strongest competitors for international trade in the world's markets, surpassing the United States in spite of her incomparable resources, surpassing France, in spite of that country's longer period of development, and having become a source of alarm to Great Britain in spite of the latter's better developed resources and the advantage of two centuries of commercial supremacy. Germany has achieved so much in so brief a time, be it noted, not because of any extraordinary resources, nor merely because of her rapidly increasing population. Meagre, indeed, are her resources as compared with those of the United States. One of the factors of Germany's success is a quality acquired through centuries of intensive labour,—the capacity for taking pains. The second factor that has been at the basis of the development of present industrial Germany is the paternalistic state. The paternalism of the German Empire, applied to the creation of industrial efficiency, has secured wonderful results from the limited resources given by nature to the German people.'

'Students of industry became the advisers of the Government, the scientists in the laboratories of the Universities gave their services to agriculture and manufacturing; geographers and travellers studied with minuteness the physical characteristics of foreign countries; trade schools were established for the development of skilled factory labour, and schools of commerce for the training of salesmen.' (p. 151).

'The same may be said of the Japanese. Their development has been not less remarkable, and it is to be attributed not less to technical education. For some years the Japanese have been sending young men abroad to secure training in the military, naval, and industrial arts. We have just witnessed the remarkable results of such training for war; the results of the similar training for industry are not forced by circumstances into so high a light, but they are not less significant.' (p. 152).

The second paper is on "Scientific and technical education" by Professor, H. N. Allen, College of Science,

Poona. Prof. Allen points out that Lord Macaulay in his famous minute on Education, had distinctly in view technical education also. In the opinion of Prof. Allen—

‘ Clearly what Lord Macaulay had largely in mind was the introduction of scientific and technical education, to replace the immemorial system in which the ancient scriptures were committed to memory by the pupils, under the guidance of instructors, who often did not themselves understand what they taught. Although the forces of conservatism have been strong, and seem sometimes to have been aided by those who have the perfectly laudable aim of imparting a sound literary education to the thousands of Indian students who desire it, yet progress is at last being made.

Technical instruction, pure and simple, is now being rapidly developed by the efforts of Government, Municipal bodies and private benefactors.’ (p. 104).

To avoid the probable danger of the supply of trained men exceeding the demand for their services, the author lays stress on the need of enterprise on the part of capitalists and merchants for starting new shops and factories to provide for these young men. When a youth after leaving school starts work under commercial conditions, he may not at once shine by the side of persons brought up in the hard school of a shop or mill. He should however, not be judged too hastily. Time should be allowed him to become acquainted with the severe conditions of commercial life. The author justly complains that nearly all the students who join the Technical School are from the middle class. Why should not the sons of wealthy merchants train themselves to be “officers in the industrial army?” The son of a manufacturer ought to train himself in mechanical Engineering or industrial chemistry, that his father’s business may not crumble to ruin. Each pupil must learn to “form his own deductions from evidence collected by himself or set before him by his teacher,” instead of borrowing without question views of others.

Mr. M. D. Sant,^a Asst. Secretary, Indian Industrial Conference, Amraoti, contributes a very interesting and suggestive paper on “A plea for naval schools and colleges

in India." Mr. M. B. Sant has made therein some very original suggestions and submitted a practical scheme for the revival of mercantile marine and ship-building industry, for the earnest consideration of his countrymen.

After alluding to the present wave of a general industrial awakening and the efforts for the spread of technical education, he brings out prominently the fact that one important branch of Technical Education, *viz.*, the Art and Science of Navigation and Naval Architecture is entirely ignored both by the Government and the people.

Mr. Sant shows that nearly 30 centuries ago India was acquainted with Inland and Ocean Navigation and her mercantile marine carried her commodities even to the most distant parts of the world. In the reign of Chandra Gupta and other ancient kings there were officers corresponding to the modern Port Commissioner, etc. Even coming down to recent times, he has proved that India was not at all backward in the art of ship-building and navigation.

Mr. Sant appeals for the establishment of an Indian mercantile marine for Indian workers. This he contends would make it more possible for Indian manufacturers to place their articles in the markets of their own and other countries, and would also provide a field for the enterprise and skill of a large surplus population. Mr. Sant concludes :—

‘For effecting the revival efficiently and on modern lines of Indian navigation, I would also suggest that Technical Schools and Colleges of navigation be established at the principal ports of India, *viz.*, Karachi, Bombay, Calcutta and Madras, on the lines of the following well-known institutions of England :—

- (1) Municipal Science, Art and Technical School, Devon Port (teaches Navigation, Nautical Astronomy, Marine Engineering and Naval Architecture.)
- (2) Municipal Technical School for Fishermen, at Hull, England (teaches Seamanship, Fishing and Navigation).
- (3) Navigation School, Dundee, Scotland.
- (4) School of Engineering and Navigation, London.
- (5) The Thames Nautical Training College, London.

For the diffusion of Naval training among khalasis, other sea-faring classes and the general public important works on the theory and practice of navigation, should be translated into the principal vernaculars of India. The existing Translation Societies, like the Deccan Vernacular Society of Poona will confer a great boon on the educated public, if they set aside a certain sum every year, for translations of Technical and Scientific treatises on naval and technical subjects, instead of selecting old classical authors whose works do not possess in the eyes of the present commercial world, any value beyond mere academical interest. Educated men also should undertake the translations of such works, instead of frittering away their energies in writing works of fiction.

I trust, in conclusion, that my attempt will serve to attract the attention of the capitalists and the educated classes of India, to the revival of the mercantile marine and the establishment of Naval Schools and Colleges,—subjects which hitherto remain neglected.' (pp. 236 & 237).

Professor Sohrab R. Davar, F. S. S., the Principal of a College of Commerce in Bombay, is entitled to be heard with respect on "Commercial education and Indian industries." Prof. Davar takes a rapid survey of the growth of commercial education in foreign countries, where its importance was first realised. "Even in England the leading commercial country, it was unknown until a comparatively recent date." The rapid advance of commercial education during recent years is quite commensurate with the important part played by commerce all over the world. The only wonder is why the specialization of this line was not thought of before. The first city to recognise and introduce this education on a practical and scientific basis was Antwerp, where the first Commercial College was established in 1852. This example was soon followed by Brussels, Berlin and other cities. America and Japan soon followed suit. The success of these experiments induced the various Governments to help these colleges and schools by grants and other means. The causes which led to the adoption by England of commercial education are graphically described by Prof. Davar thus:—

'England, which has been enjoying for centuries the unique distinction of being the leading commercial country of the world, and whose children are thus armed with the practical grounding of generations, was

taken by surprise some years ago when the Germans so successfully began to storm the foreign markets that it had hitherto considered as its special preserves. They found themselves driven back inch by inch in the great commercial strife that ensued and at last they thought it time enough to investigate into *pros* and *cons* of this unexplained strength of their rivals. The result was not far to seek, for the great Schools of Commerce in Belgium, France, Germany, Austria and America were famous for the good work they were doing. In France and Germany the diploma granted to the successful candidates in Commercial Examinations reduces the term of compulsory military service, thus placing this diploma on a par with those for Law and Medicine. (p. 221)

Thus when the British nation was brought face to face with this problem, the practical instincts of the race were not slow to feel that in this one particular direction at least, its rivals had succeeded in stealing a march over it. Steps were at once taken to make up for lost time and that great institution, the London Chamber of Commerce appointed a Special Committee for Commercial Education which framed out a model scheme for imparting Commercial Education to England's rising generation.' (pp. 221 & 222)

There has been a lamentable neglect in India of commercial education, and the author expects his countrymen to rise to the occasion and lose no time for starting commercial schools and colleges, if they at all care to avert the ruin of their industries.

Mr. R. S. Troup of Imperial Forest Department, Dehra-Dun, gives in his paper on "Indian woods suitable for match manufacture" very valuable information which ought to be utilised by those actually engaged in or desirous of starting this important industry which holds out an unlimited field.

Mr. Troup shows that past attempts in starting match Factories did not completely succeed owing to wrong choice of sites, lack of expert advice, and ignorance with regard to suitable woods. That there is ample scope for this industry is evident from the fact that the value of matches imported into the country has been increasing by leaps and bounds, the figure having gone up to nearly 74 lacs of Rupees in 1907-08. The following

passages will give some idea of the scope for this enterprise which is generally not recognised :—

‘ So great, indeed, is the total consumption of matches in India, that it is estimated that if India were to manufacture all the matches she consumes, she would require at the present moment nearly 60 fairly large match factories in addition to those already existing, while within a few years, allowing for the probability of a trans-frontier land trade springing up, she would require at least 70 such factories.

To pursue the question a little further, it is estimated that if India were to manufacture all the matches she now imports, she would require annually for matches, match boxes, and packing cases, some 1 million cubic feet, or 80,000 tons of timber in the round. As most match woods are of the kinds known as “inferior” woods, which are often of little or no value for anything else, the benefit to the State and to the forests, through the cutting out and sale, even at very low rates, of this quantity of inferior timber, would be considerable’ (pp. 123 & 124).

Most of the existing match factories are equipped with machinery made by a Berlin firm, the “peeling” process being used for making matches and match box ‘Veneers.’ Wood is used in green state in round billets usually 1 ft., 8 inches in length and $3\frac{1}{2}$ to 8 ft. in girth. The usual outturn of these factories is from 300 to 700 gross of filled boxes per diem. There is room also for the introduction of small portable machines on the Japanese plan, as they can be conveniently carried about from place to place in forest tracts. The Japanese methods deserve more extensive trials in India. Mr. Troup enumerates about 31 different woods with their botanical names, vernacular equivalents and localities of occurrence, being suitable more or less for match manufacture. Water transport is the cheapest method of conveying timber and a site for a match factory should be on or near a Railway Station or a navigable river.

The author brings his excellent paper to a close with the following remarks :—

‘ If the match industry in India is to reach the importance which it should do, it is necessary that the qualities of matches manufactured should be of a high order ; cheapness of production ought not to be a bar, considering the comparatively low rate of labour and the abundance

and cheapness of suitable wood in some of the Provinces. In this connection competition between Indian manufacturers is quite uncalled for at present. Combination is all the more advisable, in that internal competition at present is practically non-existent, whereas foreign competition is one of the most serious menace to an Indian industry which is at present in its infancy but which with proper development has every prospect of becoming a most important one.' (p. 128)

"Some aspects of sugar industry in India" form the subject of the paper written by Mr. A. B. Shakespear of the well-known Sugar manufacturing firm of Messrs. Begg Sutherland & Co., Cawnpore. Mr. Shakespear in his treatment of the subject has displayed a rare insight into the *pros* and *cons* of the question and has placed his expert knowledge at the disposal of the Indian public. His paper is therefore a valuable pronouncement on the sugar industry, which in point of importance stands second only to the cotton industry. His paper touches upon :—

- (1) India's requirements in sugar.
- (2) How they are at present met.
- (3) The refined sugar fallacy.
- (4) Is it possible to replace foreign with the domestic refined sugar ?

(5) The difficulties agricultural, manufacturing and transport attendant upon the expansion of sugar making in India.

(6) Protection of this industry during development and establishment of an association of sugar producers.

The author cites figures to show that India consumes annually $4\frac{1}{2}$ million tons of raw and semi-refined sugar of sorts, produced at home and 5 million tons of foreign refined sugar. Glowing pictures sometimes drawn by enthusiasts of the enormous economic gain to be derived, if India could manufacture the whole of her sugar requirements, are more or less chimerical and are not warranted by the experience of those who had to face the practical difficulties in this manufacture. Along

with this paper may be read the portion of Mr. Noel Paton's excellent essay on "combination," where he deals with sugar industry. The conclusions of both the writers are practically the same ; causes of failure in attempts to revive this industry may be summarized thus in the words of the author :—

'Of the causes which at present tend to retard any advance towards more effective methods of cultivation and manufacture, there is the universal condition under which crops are raised in India, *i.e.*, the division of the cultivation into small holdings. With the exception of isolated tracts, the cane crop is raised in widely scattered patches, and this compels the farmer to crush his cane as near the field as possible. (pp. 130 & 131). * * * *

* * * 'The farmer is at present forced to combine with his neighbours and hire a small bullock-power mill, crush the cane, and make it into a saleable product. Here we have the root of the whole trouble. He does not recover nearly all the juice present in the cane, and he dissipates a large quantity of crystallizable sugar in the subsequent manufacturing operations. This is absolute economic waste and the sum total of the losses incurred by these little individual operations goes to make up the enormous bill which India has to pay to foreign countries amounting to nearly 8 crores of rupees' (p. 131)

* * * 'The resources at present available to the cultivator for bringing his cane to the factory are bullock carts, which is a slow and very costly method of transport and would never sustain a factory's requirements. A system of light tramways, following the main roads of the district, and radiating from the factory for distances corresponding to the capacity of the plant, is in my opinion necessary if a modern factory is to be effectively and economically served with cane supplies. As regards the improvement of field yields, the problem is, I think bound up with the intricate questions of irrigation and manure supply. It is beyond question that with sufficient supplies of water and manure, crops of cane can be raised in India which will compete in quantity and quality with those of almost any country in the world but to accomplish this, heavy manuring and abundant artificial water is required, in view of the short growing period which exists under natural conditions. In the matter of irrigation the resources of the cultivator in tracts which are not served by canals are limited by his supply of bullocks, and in short rainfall years even this source of supply fails, and with other crops to be attended to, he cannot economically concentrate all his energies upon his cane fields. I think the question of raising subterranean water for distribution from central points would well repay further investigation.' (pp. 132 & 133).

Professor V. G. Kale, M. A., of the Fergusson College, Poona, deals with "The present economic condition of India" in his excellent and informing paper. Prof. Kale essays to :—(1) take a rapid survey of the general economic situation of the country at the present time, (2) to determine the stage of growth we have reached, and (3) to indicate the directions in which further efforts should be made. The rapid rise of Japan and a close study of the industrial history of England and other countries have engendered in the minds of the people of India, the conviction that salvation of the land lies entirely in the industrial regeneration. "Memories of the past prosperities" says writer, "and despair of the future has combined to nerve men to a resolution to do something to re-occupy the ground which was fast slipping from under their feet." We quote below the concluding remarks of Mr. Kale, which contain the gist of the whole paper :—

'In short, the situation is this. An economic revolution is in progress in the land. The old national industries are dead or dying. New ones have not yet taken their place. The competition around us is keen and killing. We lack enterprise, capital, experience, scientific knowledge and sufficient State protection. Agriculture is in the most backward condition. There is congestion of labour in agriculture, which must be relieved by employment in manufactures. Poverty and ignorance stalk over the land. Conscious of their helplessness, and yet awakened to a sense of their duty, people are doing what they can to relieve the gloom that surrounds them. A ray of hope cheers their way and the Government is showing its interest in their efforts to revive old and start new industries. Most of the credit of the little progress that official reports and statistics show, belongs to European capital and enterprise. Most of what are called flourishing Indian industries with the growth of which India is usually credited, are in European hands, the fruit of their labour. The profits made from them naturally go out of the country and India is none the richer for them. People in India expect their Government to be national and do for them what other States have done and are doing for their own people. New India is Protectionist and wishes Government to adopt the same faith. The complete identification of the rulers and the ruled is the key-note of success. Single-handed, the people can do nothing. Nor have they done, it must be confessed, all that they should have. The little work that has been done only emphasises the vastness and the extreme difficulty of the whole problem. Some efforts are being made both by Government and people; but

infinitely much more remains to be accomplished. The future depends upon how we help ourselves and induce Government to help us. (pp. 177 & 178)

Mr. A. N. Datar, B. A., L. L. B., Director of Commerce and Industry, Baroda State, contributes a very valuable paper on "Industrial development of the Baroda State." It gives a birds-eye-view of the industrial activity of the State, and is an admirable resume of the steps taken year after year by the Government of His Highness the Maharajah Saheb of Baroda, who stands out to-day as the most enlightened and progressive ruler of a prominent Indian State. We regret the limited space at our disposal does not permit us to do full justice to the contents of this paper. We can merely mention some of the important institutions and industrial concerns which are progressing under the patronage and fostering care of His Highness :—

(1) Agriculture being the chief industry of the population deserves primary attention. In 1884 Rao Bahadur Khase Rao Jadhao, who is now the Collector of a District was first sent to England for being trained as a specialist in agriculture. This system of training up specialists in foreign countries has since continued.

(2) To impart practical instructions to the ryot in agricultural matters, demonstration farms and seed depots have been established. Information regarding new manures and other matters is circulated to them. Cultivators are taught improved methods of dealing with insect pests and blights. Dairy industries are spreading, almost every village being now provided with cream separators. The butter industry has become so profitable in certain localities that one village alone annually exports butter worth 2 Lacs of Rupees.

(3) Under the supervision of the late lamented Mr. N. G. Mukerjee a school of Sericulture is established at Vyara for making experiments in rearing eri worms ; it is making a steady progress.

(4) The kalabhuvan is already known far and wide for the excellent work it is doing in connection with technical education. A weaving class was added to this institution in 1897 and a class for watch making in 1902. Facilities are also provided for the training of artisans.

The Bank of Baroda, a few Agricultural Banks, Co-operative Credit Societies, and several other useful institutions are doing excellent work in the Baroda State.

"True patriotism and real swadeshi" is the title of a paper contributed by Mr. John Kenny, Director of Agriculture, Junagad State. We must give Mr. Kenny credit for the refreshing candour with which he has expressed his views on current problems. He is justly indignant at the tall talk in which certain people indulge, without realising the necessity of self-sacrifice. Says he :—

'We hear so much now-a-days of the progress of Japan, forgetful that one little but very important fact is left out of calculation when India is asked to follow in Japan's footsteps. The noble warrior class practically annihilated themselves before an advance was or could be made. Have we any such example in India? When we have, India will soon be a self-governing colony. This is true patriotism—the forgetfulness of one's self for the benefit of one's country.' (p. 196)

Mr. Kenny is very enthusiastic about improvements in Indian agriculture and hold the following views on this subject :—

'The work before the leaders of India lies in the agricultural line if it is to show any lasting success. Thirty years is a very small span in the life of a nation. Yet within that time wonders were wrought in Europe amongst the peasant population. Their priests were their natural leaders and devoted themselves heart and soul to the amelioration of the lot of their poor parishioners. Can we not find people in India to devote their lives to a similar object, men who will endeavour to spread the three R's in every village and add a little more to the knowledge of manures and their value? The sowcar must be replaced by the Village Banks and the Village Bank must be prepared to supply the best and cheapest artificial fertilizers where natural manures are insufficient, as is the case in all parts of India. That the Raiyat will take advantage of cheap money and cheap supplies of manure is amply proved by the "Interim Report of the first crop year 1908-1909 of the Nira Canal Tagai Loans Scheme, Poona District." Money to the extent of Rs. 2,66,500 was advanced on crops at 9 per cent interest and the

recoveries for this first year were Rs. 2,25,689 and Rs. 18,395 as interest. Rs. 2,07,815 were advanced against the crops due between October 1909 and June 1910.' (p. 197)

We now come to the paper of Mr. S. D. Saklatwala, B. A. of the Empress Mills, Nagpur, on "The Textile Industry of India, its present condition and future prospects." Mr. Saklatwala is an authority on the subject he deals with and his views ought to command close attention. The following factors have in the opinion of this writer contributed to direct the attention of the general public to the condition of our industries :—

- (1) Problem of labour.
- (2) Difficulty of dealing with strikes.
- (3) Question of short time working.
- (4) Want of technical education.
- (5) Problem of housing the operatives.
- (6) Home and foreign competition.
- (7) Swadeshi movement.
- (8) Factory commission.

The textile industry has "passed through many changes and though carried on in the past by more or less inefficient labor, under ill-qualified supervisors and in many cases by managers, who were merely content to follow old time methods and presided over by greedy agents, this industry stands to-day on a fairly strong basis.

Lack of joint effort, increase in production just at a time, when the market was in a depressed condition, disregard of the impetus given by the Swadeshi movement to place on the market products hitherto supplied by foreign rivals shortsighted policy of turning out worthless goods to compete with the fine products of Lancashire, slackness in keeping hold of already established foreign markets by supplying goods of uniformly superior quality, want of systematic effort to find out new markets, woeful lack of originality, servile imitation of better class mills,

marking of inferior goods with the number of superior mills, imitation of labels and trademarks of other factories—all these are the drawbacks of the present textile industry of India.

One remedy suggested by the author deserves a very careful consideration at the hands of those who are engaged in this line and are struggling hard for success. "Why can our mills (says he) not specialise, certain mills supplying only certain lines?"

The author deplores the injustice which is being done to this industry by the levy of the iniquitous Excise duty, but welcomes the advent of the new factory bill, which, in his opinion, is bound to prove beneficial eventually, as it will rescue the operative and increase his efficiency.

In concluding his paper, Mr. Saklatwala calls the attention of capitalists to the necessity of improving the quality and quantity of cotton supply and also to the formation of reserve funds for the permanent stability of the industry.

Mr. C. S. Raghunath Rao of the Agricultural College, Pusa, in his paper on "Gardening and box making" puts forth "a plea for nature study and manual training" and his treatment of the subject is deeply interesting.

To a nation desirous of entering upon a career of industrialism after centuries of indolence and indifference for the progress in the country of modern arts and sciences, the sound advice of Mr. Raghunath Rao is quite opportune, as it will lead to the training of the younger generation along more practical lines, instead of their taking to the merely academical courses. The author largely quotes Professor Geddes to show that "any system of education worth the name should have in view the development of all the faculties and such development is best attained by the use of tools and gardening work." Adds he :—

'Does gardening give the rustic child this needed schooling? Yes, and to an extent that books can never dream of doing. The latter can load the memory of the pupils with facts, but they can never train the

powers of observation and give the children an intelligent interest in the every-day facts of rural life. The training which a child receives by gardening leads to an appreciation of the dignity of labour, and of the beauty in nature, and eventually arouses in him a spirit of enquiry which is the foundation of all scientific progress and research. It will thus be seen that the education of the rural child has a large bearing on the progress of agriculture and the prosperity of the country.' (p.201).

' In the first place, the boy who uses tools must necessarily use both his eyes and hands, and the value of this training in later life cannot be lightly estimated. Secondly, the tools employed call into play all the muscles of the body, including those of the leg, trunk and chest. Thirdly the boy enjoys the work —this cannot be said of books, for few boys ever think of taking a book unless compelled to do so, and on this account he is impelled by the interest of the work to develop the powers of thinking. And lastly, the occupation, involving as it does personal effort, develops the boy's will-power. In short, there is no other occupation in which a child can so well and simultaneously develop his physical, mental and moral powers. As regards the other objection that the ideal of the occupation is low, it need scarcely be pointed out that the financial consideration of the work does not at all enter the boy's head.' (p. 201).

What is of the utmost importance is that instruction in rural schools should be so arranged that "*teachers may teach less but learners learn more.*" The advantages of box making or similar pursuits requiring the use of tools may be summed up thus in the words of Dr. Larsson, one of their ablest exponents :—

1. It arouses self-respect and instils respect for all honest labour.
2. It develops self-reliance, concentration and the power to make and execute a plan.
3. It develops habits of order, accuracy and neatness.
4. It develops the æsthetic sense, the power to judge rightly as to beauty of form and proportion.
5. It develops right feeling by stimulating the desire to be useful, and by its appeal to the affection through the cultivation of consideration for others.
6. It strengthens the will by offering such motives as will induce a boy to work hard, and steadily to overcome increasing, but carefully graded, difficulties.' (p. 206).

We now come to Mr. Puran's contribution on "the utilisation of some Indian tanning materials for the manufacture of tannin extracts." Mr. Puran F. C. S. in his capacity as Assistant Imperial Forest Chemist, Dehra Dun

possesses special facilities for accurate study and research in the subject he has so ably dealt with. Mr. Puran points out that with the advance of chemical science, the old methods of bark tanning have now been replaced by new processes dependent on the use of tannin extracts. The industry of preparing these extracts is assuming great importance in France, Germany, England, America and other countries. He quotes statistics to prove that the demands for bark and wood for feeding the tannin extract factories is so enormous that serious apprehensions are entertained of the approaching shortage of the raw materials. It would be more economical and paying, if factories for these extracts are established in the heart of the forests of India and other tropical countries. The author then gives a list of forest trees which contain tannin and exhorts his countrymen to start these factories in suitable localities. He has drawn up a complete estimate of the probable amount of capital required for starting a tannin factory.

The paper of the Hon'ble Rao Bahadur G. V. Joshi on "Thoughts on the Calcutta Exhibition of 1906" deserves a very careful perusal and a prominent place owing to the originality of the several important suggestions made therein and its breadth of view.

We give below the summary of his paper in his own words :—

(1) The formation of *Trade Museums* at all the provincial centres and in the Presidency towns, as also *one central museum for all India*.

(2) The publication of descriptive catalogues and hand-books both in English and the principal Vernaculars regarding the more important economic products and manufactures of the country.

(3) The institution of *special inquiries* in the Department of Commerce and Industry at each exhibition with a view to ascertaining the requirements of foreign trade in Indian articles.

(4) Collection of *samples of foreign manufactures* and supplying *information* in relation to them—the methods of manufacture and the machinery employed—to the *native manufacturers*; *one or two industries to be selected* for such treatment at each exhibition—industries for which India possesses special facilities.

Much work has to be done on the same lines in regard to *mining*.

(5. Request to Government this year to place Mr. Hadi and Mr. Dutt on *special duty*, one in connection with sugar-refining and the other in regard to mining who should visit the various Provincial centres with a view to dissemination of a knowledge of the newer methods amongst the people.

As regards art work, organisation of.

- (a) *Local Museums and Local Committees.* } at the centres of art manufacture.
- (b) *Provincial Museums and Provincial Committees* } with a view to a comprehensive effort.
- (c) *Moveable exhibitions*—In foreign countries with a view to promote a wider appreciation of Indian Art work.

(d) The formation of a bureau of Indian Arts under the direction of the ministry of Commerce and Industry to have the care of all this work. (pp. 285 & 286).

A complete description of the industrial activity of Kashmir will be found in the exhaustive "Notes on the arts and industries in Kashmir" drawn up by Mr. A. Mitra, Public Works Minister. Mr. Mitra reviews historically the following industries of the State with valuable suggestions for their revival :—

- (a) Shawls.
- (b) Embroidery.
- (c) Woollen, cotton and textile fabrics.
- (d) Carpets.
- (e) Paper mache.
- (f) Wood work and wood carving.
- (g) Metal work.
- (h) Stone work and carving.
- (i) Sericulture.

The author points out that Kashmir affords very suitable ground for the advance of technical education owing to general dexterity of its inhabitants. There is also ample scope in that state for the introduction of nearly twenty industries which may be taken up in right earnest by the people of Kashmir or outsiders who may find it convenient to settle there.

"Joint Stock Companies and Co-operation in the Punjab" is the title of a very instructive and informing paper

by Mr. W. S. Hamilton, Registrar, Joint Stock Companies, Punjab. In his opinion—

‘ Mistakes have been made and failure has been not uncommon : many Joint-Stock Companies are defunct, others are moribund or racked with disease ; but those which are still alive, must be nursed into greater vigour ; and the multiplication of healthy Joint-Stock Companies is not only beneficent but indeed indispensable. We can bless the movement of co-operation amongst capitalists and recognize it as a mighty industrial power while we do not shut our eyes to the disasters of the past and the blemishes of the present.’ (p. 304)

After defining a Joint Stock company as a combination of small capitalists to form one large capital to be used for specific purposes under the direction of the representatives of the capitalists, the author proceeds to point out the importance of the following factors for the successful working of these concerns :—

(1) Sufficient funds for buildings, machinery, payment of salary and wages, to tide over the initial period unremunerative outlay.

(2) Public confidence, without which there will be no response to the blandishments of the company promoters.

(3) Necessity of corporate along with individual honesty.

(4) Like the captain of a ship or the general of an army, a director of a company must possess “ scientific knowledge, presence of mind, dash, courage, zeal, and the habit of command.”

(5) The promoters or contributors of capital must not usurp to themselves the actual management of the concern.

(6) There should be no hurry to declare a large dividend and to make its early payments.

(7) Shareholders should exercise in full their rights of supervision over the working of the concern.

(8) The correct audit of accounts by officers approved by Government.

Professor Jogindranath Samaddar contributes two valuable papers one containing "Some reflections on co-operative credit" and the other describing the "progress" of that movement." Professor Samaddar proves conclusively with the aid of reliable statistics that since the passing of the Co-operative Credit Societies Act in 1904, the movement is spreading with extraordinary rapidity during the last few years and its beneficent results are becoming perceptible, the money lenders in many districts having reduced the rates of interest. The Urban and Rural Societies and the Agricultural Banks show a distinct advance and the prospects of this movement are on the whole very cheering.

The contribution of Mr. C. S. Raghunath Rao on "Agricultural credit" should be read with the above paper. In any scheme of agricultural reform, says he, "the organisation of capital must perforce take the first place." His treatment of the subject is very able and exhaustive and any attempt at summarising the contents of this paper would mar the effect of the original, which we would strongly recommend for the careful perusal of all interested in the subject.

"Life Insurance in India" is the theme selected by Mr. Narain Das, B. A., C. E. of Amritsar for his extremely wellwritten paper. Insurance is a very old business in Western countries. It commenced first with Marine insurance and then it came to be applied to life and fire. Its modern developments, may be described thus :—

' We can not only insure our ships against the fury of the waves, our houses or property against the risks of fire, or make suitable provision for those dependent upon us after we are called off to other words by a Higher Power that rules our destinies but we can secure compensation in the event of loss of sight or limbs through accidents and, if we are, only up to date in our information as to the various schemes of Insurance in force in the West, we can insure our crops against the devastation of hailstorms, our plate-glass against the carelessness of servants of mischief mongers, our cattle against the ravages of disease our ledgers against bad debts and our business investments against the

risks of possible loss. We can have the fidelity of our clerks and establishment guaranteed and our race horses assured against the infidelity of grooms open to temptation. Add to these, the House Purchase Schemes that have been recently introduced and have become so popular in Europe, and you have, before yourself, the whole Modern Assurance business in a nut shell. You will, thus, see how largely it guards, enriches and improves human life in all its aspects and connections, social, industrial, physical, and even political.' (p. 291.)

The insurance business presents in fact an unlimited field and it behoves our country men to seriously devote their attention to this important branch of national industry. After alluding to the principal insurance companies started recently with Indian capital and working under Indian management, the author proceeds to a detailed consideration of the principles involved in Life Assurance business and points out the items which bring jointly or severally revenue to the coffers of a Life Office which it is needless to recount here.

As a managing proprietor of the boot and shoe factory of Amritsar, Mr. D. N. Rozdon has very practical suggestions to make anent "Tanning and leather manufacture." He speaks from personal knowledge and practical experience of the subject he deals with. After describing the various uses to which leather can be applied, he proceeds to point out the importance of establishing tanneries on modern lines in different parts of India as there is unlimited scope for this industry.

We have now to call attention to an excellent paper or rather a treatise on the "Development of Glass-making" by Mr. Alakh Dhari, Secretary, Upper India Glass Works, Amballa city. Mr. Alakh Dhari is an expert in Glass-making and his genuine interest in the subject may be gauged by the amount of labour that he appears to have bestowed in collecting valuable information and in making many practical suggestions. "According to Pliny and other classical writers of Europe" says the author, "there was a tradition among the ancient that the best glass in the world was manufactured in India," Antiquarian

researches have also disclosed the interesting fact that glass-making was known in Egypt, Phœnicia, Greece and Rome. Through Budhistic and other influences, the art appears to have travelled from India to China and Japan. The glass bangle industry seems to have existed at least for the last three centuries and it is yet lingering on in several places even in spite of fierce foreign competition. The principal old centres of glass-making are Najeebabad, Benares and Nagina in U. P. and some places in Bengal and Punjab, where glass phials and flasks are manufactured.

During the last 25 or 30 years, a new school has come into existence for developing this industry on Western lines. Two factories in Bengal, one at Sodepore and the other at Titagarh had to close their business owing probably to the inexperience of the promoters and other causes. The Rajpur and Ambala factories and several other ventures in this line are being made at present in different parts with varying degrees of success.

The difficulties in glass-making may be enumerated thus :—

‘A serious obstacle in the way of the rapid development of the new school of glass-making is the scarcity, or rather the absence, of a tolerably pure supply of indigenous alkaline base for making glass. If our scientists could succeed in devising some method whereby sodium chloride, which is so abundantly available in India, could be introduced into the glass-pot in its natural (*i. e.*, common salt) form, this great problem would soon be solved. As it is, the volatile character of the chloride at high melting points presents a serious difficulty; for, before the sodaic substance can combine with silicic and other ingredients, a great portion of salt disappears by vaporisation. This difficulty has been overcome in Europe by first depriving sodium or potassium chloride of its volatile character and for this purpose it is converted into a sulphate by the direct action of sulphuric acid. The resultant substance is rendered anhydrous in a reverberatory furnace and then calcined with a mixture of lime and coal forming a black coloured carbonate, which is afterwards lixiviated in a successive number of tanks in order to produce the commercial carbonate of soda. This method of treating salt is known as the famous ‘Le Blanc’ process. Another treatment of salt, which is called the ‘Ammonia-Soda Process’, consists of gaseous Ammonia being passed into a solution of salt

and water and played on by carbon di-oxide until the solution is thoroughly saturated. The acid carbonate of soda, thus formed, is heated and turned into the carbonate of commerce. A number of bye-products are also obtained and as they have considerable commercial value in Europe, the cost of the main product is very much cheapened there.' (pp. 275 and 276.)

The author makes certain valuable suggestions which can only be studied by reference to the original paper. To this group belongs the paper of Mr. Kannayalal, Drawing master, Lahore, on "Pottery, tiles manufacturing, glass-making and enamelling." Mr. Kannayalal shows the importance of these industries and describes the processes employed by Indian artisans, and appeals to his countrymen to emulate the example of an Englishman who, for the sake of learning the secret of manufacturing steel, joined a Japanese factory in the garb of a beggar and enriched himself and his country after mastering the secret.

"Cocoanut oil and coir industry" are dealt with by Mr. R. R. Nabar, B. A. of Bombay in an exhaustive and ably written paper. Facts and figures collected by Mr. Nabar disclose a true business insight and furnish valuable material for those interested in manufacturing various articles as well as the bye-products of the cocoanut, which grows so abundantly in several parts of India, with the aid of modern machinery and appliances. The author estimates the total output of cocoanuts in India at the colossal figure of 360 crores every year. Mr. Nabar demonstrates with the aid of reliable statistics that exports of cocoanut fruit and copra are steadily increasing, while exports of coir have fallen. This shows that Germany, England, France and U.S.A. who are our customers prefer to purchase our raw materials, as they wish to provide employment to their own capital and labour and thereby get a larger return on them." Consequently Indian capital and labour remain unemployed. Oil, cocoabutter, candle, soaps, mattresses, cordages and several other articles and bye products are made from the cocoanut. This fruit can be divided naturally into four distinct parts.

(1) The outer husk out of which bristle or coir is made.

(2) Kernel or copra for oil and butter.

(3) Shell for buttons and other articles.

(4) Water for several bye-products.

The advantages in favour of this industry as well as the practical difficulties in its way are thus described by author:—

SOME ADVANTAGES IN FAVOUR OF THIS INDUSTRY.

(1) The Indian Cocoanut is the best of its kind in the matter of oil and color yielding properties.

(2) The crop is available four times a year at a short interval of three months and so the mills and other works need not be closed like those for expressing cotton seed oil where the crop is only once a year.

(3) The cocoanut crop is more independent of the vagaries of the monsoon than cotton, wheat, &c. Consequently, the prices do not much vary and therefore, will not disturb the continual working of the mill.

(4) The raw material is very cheap in comparison with the price of the very finished articles such as cocoabutter and the manufactured articles of coir.

(5) Labour and fuel are cheap and plentiful.

(6) Cocoanut trees being along the sea-coast cost of carriage, both for raw and finished articles will be the least.

(7) The amount of capital required for starting a large mill with all the latest appliances for turning out all the abovementioned finished articles will be comparatively small, that is, a few lacs.

(8) The market is certain, both for raw and manufactured articles, both at home and abroad.

CERTAIN DEFECTS WHICH CAN BE REMOVED EASILY.

(1) Introduction of modern machinery on a larger scale and more scientific methods in the place of antiquated and wasteful ones.

(2) Establishment of Techno-Chemical Laboratories like that of Prof. Gajjar in Bombay in connection with the oil and coir mills to find out how bye-products can be made out of waste materials. (pp. 352-353)

“ High prices of food stuffs in India is the subject chosen by Mr. Seedick R. Sayani of Bombay. Mr. Sayani points out that the trade of any country is affected, by wages prevailing therein and these chiefly depend on the prices of the necessities of life and argues the need of this subject being taken up by the Industrial Conference

for the purpose of suggesting some remedies for the prevailing high rates. The price of an article being its value in terms of money, the lowering of the value of money, *i. e.* (Silver) has been one of the principal causes of the phenomenal rise of prices in India.

According to Mr. Sayani prices are affected by the following causes :—

- (a) Foreign competition.
- (b) Growth of population.
- (c) Importation of precious metals, especially silver.
- (d) Opening of the country by railways, telegraphs, etc.
- (e) Building up of real credit.
- (f) Fall in the price of silver compared with that of gold.

Mr. A. P. Ghosh of the Commercial Intelligence Department, writes on “Brinjal cultivation.” Mr. Ghosh gives an estimate of the total expenses per bigha and proves that it is a very lucrative industry.

SUMMARY OF PROPOSALS AND SUGGESTIONS

A.—The work of the Conference

1. Future Exhibitions should be attached directly to the Industrial Conferences rather than to the Congress. (*Lala Harkishen Lal*, p. 5.)
2. The Conferences should be held at Easter rather than at Christmas to enable people to devote more time and more attention to economic subjects than has been hitherto the case. (*Ibid*, p. 5.)
3. The Industrial Conference would be doing a deal of good, if it directed its energies in classifying industries into groups, susceptible of Village system, Factory system and otherwise. (*Ibid*, pp. 11-12.)
4. The Industrial Conference and its members, should familiarise the people with the principles and application of co-operation. Co-operation may in a measure overcome the difficulties experienced by people in acquiring sufficient capital for their undertakings. (*Ibid*, p. 12.)
5. It might serve a good purpose if this Conference were to appoint a small select committee to consider the whole question of standardisation (of weights and measures) and to report at the meeting of the Conference next year what in their opinion ought to be the best means of gaining the end in view. (*Maharaja Sir Rameshwar Singh Bahadur*, p. 23.)
6. If the result of the deliberations of the Conference is to appoint a committee, as the Maharaja suggests to further consider this subject (Standard weights and measures) and bring it prominently before the public, I am sure that that result will be of the greatest possible benefit. (*His Honor Sir Louis Dane, the Lieut.-Governor of the Punjab*, p. 29.)

7. Capitalists should be furnished with approved forms suitable to any particular industry. (*Mr. F. Noël Paton*, p. 56.)
8. These meetings would be more fruitful if one or two specific subjects were prescribed for each year and arrangements made for a symposium of opinion from all the several provinces of India. The speakers would then come up with their budget of local experience and in many cases we should probably make a definite step towards action or at all events towards the formulation of a principle and a policy and towards the prescription of lines to be followed at the succeeding meeting. (*Ibid*, p. 58.)
9. It behoves those concerned in the many industries of India, and especially the sugar industry, to be prepared for the change (in the trade policy of the empire) should it come about, for on no industry in India would the initiation of a protective tariff have as far-reaching effects. It seems to me of the utmost importance in these circumstances that the industry in this country should take steps to coalesce and frame a definite policy for its guidance. (*Mr. A. B. Shakespear*, p. 133.)
10. This Industrial Conference should do all in its power by practical measures to attract the attention of the people to the true value of Industrial and Commercial Education as vital factors in national and international progress. (*Rev. T. C. Badley*, p. 159.)
11. The Industrial Conference shall get Actuarial Training included in the list of foreign studies worthy of attention at the hands of our rising students. (*Mr. Narain Das*, p. 299.)
12. We should establish the Indian Industrial Development Society with head-quarters either in *Bombay* or *Calcutta* and branches in every province with sub-agencies in every city. The Head Office should

be in a position to provide every kind of information the branches might require for the development of indigenous industry and in establishing new industries, the work of the provincial branches should be to be in communication with the people and put before them proposals and some ideas in which way certain industries should be carried out and if developed what machinery and what expenses would be incurred and also what profit could be made out of them. The chief aim of the branches must be to form companies and if companies are floated, people will take a larger interest in the work than if such concerns are financed by single persons. (*Mr. A. Tellery*, pp. 301-302).

13. The branches and Head office should also help the manufacturer to find a market for his goods and also be helpful to him in other ways. The Society should give all preliminary advice *gratis* but if the person or company is starting work or ordering goods through the society, then in all such work a certain commission should be charged which would pay something towards the expenses. (*Ibid*, p. 302.)
14. The Society should be the right hand of the Indian Industrial Conference and through it the Conference would be in a *position* to verify all the information necessary to be put before the General Meeting which requires to be brought before the general public or the Government. (*Ibid*, p. 302).
15. An annual report of the working of the Society should also be put before the General Meeting of the Indian Industrial Conference for the information of the public and the members of the Committee. (*Ibid*, p. 302).

B.—Investigation

16. It is a problem worth considering whether we should direct our energies towards centralising institutions and work them on Factory system or devote our attention towards what is now termed village industries. (*Lala Harkishen Lal*, p. 11).
17. The first and principal need is an investigation by eminent authorities of the potentialities of sugar production in India on modern methods and this investigation must be conducted under practical working conditions. A mere *ipse dixit* that salvation is to be found in this or that system, is not sufficient to convince capital, much less Government, and we must be able to present to both an undeniable proof that India can supply the consumer with the white sugar internally as cheaply as our competitors over sea. Once establish this fact, and a case is made out for protecting the domestic industry, temporarily at any rate by means of a moderate import duty in order to encourage capital to engage in its development. (*Mr. J. B. Shakespear*, p. 134).
18. In my last year's article I suggested that a committee be appointed in every province to go thoroughly into this industrial question and prepare schemes of work which can be carried out. (*Mr. A. Tellery*, p. 301).

C.—Education

19. Scientific agriculture must begin to be taught and learned at all the primary schools in India, every pupil being practically instructed by means of gardens being attached to each school. (*Maharaja Sir Rameshwar Singh Bahadur*, p. 17).
20. The agricultural education of the people must be put in the foreground of the endeavours of the Government and of all our educational authorities. (*Ibid*, p. 17).

If these undeveloped resources along with the other mineral wealth of the land such as iron, manganese, mineral oil, etc., etc., are to be exploited by the sons of the soil, no time should be lost in encouraging the educated youth of the country to specialise, in the departments for which they are fitted, for their future work. We have already technical schools and colleges but these educational establishments will have to be multiplied manifold; all parents and guardians who have the means should give the heartiest encouragement in their own spheres of influence, to that technical education, without which their sons will be of little use in taking a grip of the professions and industries by means of which we hope to work out the commercial and industrial salvation of India. (*Ibid*, p. 19).

Chemists and Electrical Engineers are wanted in India and these are professions eminently suited for educated young men. The time is at hand when every considerable engineering and textile work will have an expert chemist on their staff, and as for applied Electricity, the vision before us is one of incalculable progress in every sphere of life (*Ibid*, p. 20)

For example it would be difficult for a man who had dealt in wheat all his life to be sure that if he erected a flour mill and employed a manager he would be able to check that manager's estimates of cost of production at any given date. My own opinion is that our commercial schools ought to give more attention to these matters than is now bestowed on them. The comparative failure of technical and scientific education is attributable to the fact that students are not taught how to find the costs of the materials and processes involved in their operations. (*Mr. Frederick Noel Paton*, pp. 55-56).

24. The first advance that must be made is to encourage a belief in the dignity of manual labour ; to realise that it is not the dust and sweat of industrial pursuits, (which can be washed off by the application of a little soap and water) that defile a man; but that not all the holy water of Ganges can eradicate the stains too often produced on the mind by the influences to which youths with busy brains but idle hands are subjected. (*Mr. T. H. D. La Touche*, p. 84).
25. The foundation and fostering by Government of Universities and Schools however indispensable they may be, can never by themselves supply the whole of your needs. But you should encourage the smallest spark of inventive and constructive genius that may from time to time discover itself in the younger men of the coming generation, especially in those of the better and well educated classes ; and above all, by using all your influence to discourage the idea that there is anything derogatory to personal dignity in engaging in manual labour. (*Ibid*, p. 84).
26. The cabinet maker or carver should be able to provide his own patterns, just as much as the illuminator who does the actual work himself. The teaching and suggestion of the tool is as important if not more important than the actual use of the tool itself. (*Mr. W. S. Hadaway*, p. 88).
27. The head of the institution (art school) should be not only conversant with many crafts, but a master of one at least and a man of catholic and wide interest and sympathies and fine artistic taste and perception. (*Ibid*, p. 90.)
28. So far as the actual conduct of a School of Art goes, local circumstances will affect the curriculum, the artistic crafts known or practised in or near a parti-

cular place, and other crafts new to the place which may be of benefit to already existing industries should be the first thing to consider. (*Ibid*, p. 91.)

29. If there is any likelihood of picture painters working successfully after their training in school, likely students should be encouraged to study painting and drawing with this object in view—the difficulty in Madras in this respect is to get really good teachers, and poor teaching is almost worse than none. (*Ibid*, p. 91.)
30. Drawing masters, too, for employment in schools of general education should be taught, though, here again the same difficulty as to teaching crops up. (*Ibid*, p. 91.)
31. Furniture making, too, would be greatly improved if the ordinary tradesmen followed the patterns and careful workmanship of the best school work, and the metal-work of the country, so important a craft in almost every part, should look to the schools for improvements in patterns, and in alloys. (*Ibid*, pp. 91-92.)
32. Another mistake is in looking to a School of Art as a place where experiments toward the starting of new industries are desirable. This should be the work of either a separate Government department, or, better still, of enterprising individuals, who might, if successful ultimately benefit by their own Pioneer work. (*Ibid*, p. 92.)
33. Many a good workman would be more efficient with a knowledge of drawing, and for carpenters and metalworkers, a knowledge both of decorative drawing and enough simple geometry for practical use is desirable. (*Ibid*, p. 93.)
34. Ornamental drawing can best be taught to young students by copying and adapting good specimens of old work. (*Ibid*, p. 93.)

35. The well known acanthus leaf ornament of the west is the backbone, the foundation of all ornament and whether it nearly represents actual leafage in nature or not it is still the great essential in designing. Other well known units or designs, the mango, the peepul leaf, the lotus, and the host of grotesque and animal forms commonly found in old work should be thoroughly well taught to the student. (*Ibid*, p. 93.)
36. Improvement may be made by references to nature and by becoming familiar with certain well-defined natural characteristics, such as reasonable anatomical structure and simple and possible growth. Even a grotesque form should look as though it might be possible and joints and legs should not be so far from nature as to be ridiculous. (*Ibid*, p. 93.)
37. It is essential, if drawing and painting by western methods is to be practised, that a knowledge of rendering objects as they appear to the eye be gained. This is a matter of close observation, of teaching the pupil to see accurately, more than anything else. (*Ibid*, p. 94.)
38. It is, on the contrary, essentially necessary that the younger members of families of good social status should learn the best methods of running a large factory and qualify for responsible executive positions in such a factory. (*Mr. J. E. O'Connor*, p. 100.)
39. Technical Schools and Colleges are wanted, and as usual the tendency is to look to the state to supply them. Let me recommend however, that the community should found them and should be content with grants-in-aid from the state. The late Mr. Tata of Bombay gave a noble example of how such things should be done, and I wish that there were even ten other men like him, patriotic,

independent, far-seeing, and splendidly public-spirited, ready to do something like what he did. (*Ibid*, p. 100.)

40. When a youth first leaves school, he should however, not be judged too hastily. Time should be allowed him to become accustomed to the severe conditions of commercial life, when it should be found that, in many cases, his grasp of principles, his avoidance of rule of thumb methods, his cultivated intelligence and even his gentlemanly bearing will make him a much more valuable man to his employers than those who have not had his educational advantages. (*Mr. H. N. Allen*, pp.104-105)
41. Sons of the wealthy manufacturers, should be training themselves to be officers in the industrial army. Wealth is a stewardship, and the accumulation of great fortunes in individual hands can only be excused on the ground of important services rendered to the country by those holding them. (*Ibid*, p. 105.)
42. The sons of a rich man are in duty bound to prepare themselves, by every means in their power, for the future administration of their fathers' wealth; learning how to use it to increase the prosperity and happiness of their fellowmen. (*Ibid*, p. 105.)
43. A man who in the future will draw a large income from agricultural sources should, in general, study agriculture thoroughly and scientifically, and devote his life to the agricultural development, not only of his own estates, but also of the surrounding country. (*Ibid*, p. 105.)
44. The son of a manufacturer should prepare himself for his life's work by a thorough course in Mechanical Engineering or in industrial chemistry, if he cannot find a school or college giving a course in the special line of industry to which he will afterwards have to devote his energies. (*Ibid*, p. 106.)

45. There are few countries in which a general diffusion of the knowledge of the methods of modern science is so greatly needed as it is in India. (*Ibid*, p. 106.)
46. Much further study will be needed before the laws of inheritance of the different human qualities, bodily and mental, are fully worked out but it does not seem an impossible dream, having in view the careful regulation of marriage which already exists in this country, that voluntary associations for the improvement of the race may be formed, the marriages of the members, and of their children, being arranged on scientific principles, so as to perpetuate, and even by careful selection to improve, the best elements in humanity. (*Ibid*, p. 107.)
47. The study of science should begin in the schools. The practice of confining such instruction to the study of a few isolated chapters in a School Reader cannot be regarded as satisfactory. Science badly taught has little value from an educational point of view. Its real value is in the training which it gives in methods of careful observation, experiment and measurement, and in the insight it gives into the manner in which knowledge is to be obtained by means of these methods. (*Mr. H. N. Allen*, p. 107).
48. Knowledge of truth should be cultivated for its own sake. (*Ibid*, p. 108.)
49. To some extent this is unavoidable ; but one could wish to see the love of learning for its own sake grafted on to the love of learning for the sake of a livelihood. (*Ibid*, p. 108.)
50. The spirit of scientific research, in natural sciences, also in Mathematics, History, Political Economy, Philology, Archaeology and Anthropology should be encouraged and developed. (*Ibid*, pp. 108-109.)
51. Experience alone cannot supply this need : the man must come to his profession with a clear-

cut knowledge of the principles underlying the problems of modern commerce and industry. To reduce this knowledge to a science and to impart it to the young men who are to be the future "Captains of Industry" of a nation is the special province of commercial training. (*Rev. T C. Badley*, p. 157.)

52. Larger numbers of Indian students must receive instruction in mining and metallurgy, licences and mining leases must be altogether withheld from or more sparingly given to non-Indians, and Indian enterprise and capital ought to be encouraged. (*Prof. V. G. Kale*, pp. 173-174.)
53. The State here must make it its serious business to see that Indian resources are developed in the interests of India and its people. It must give us all the facilities we want; nay much more. It must stimulate interest, spread broad-cast primary, technical and scientific education, send young men in their hundreds and thousands to foreign countries to learn various industries there, help capitalists and enthusiastic men to start new industries and protect them against outside competition. (*Prof. V. G. Kale*, pp. 176-177.)
54. What is most urgently needed is Technical and Industrial Education. (*Mr. A. N. Datar*, p. 178.)
55. Can we not find people in India to devote their lives to a similar object, men who will endeavour to spread the three R's in every village and add a little more to the knowledge of manures and their value? (*Mr. John Kenny*, p. 197.)
56. Any system of education, worth the name, should therefore have in view the development of *all* the faculties. Such development, in the case of children, is best promoted by occupations which involve the use of tools. (*Mr. S. Raghunath Rao*, p. 201.)

57. What is required of the pupils in rural districts is a maximum of out-door work with a minimum of book work. (*Ibid*, p. 204.)
58. (1) That a closer connection should be established between the Educational and Agricultural Departments in the control of rural education,
(2) that the Director of Agriculture should be a Member of the Text-book Committee appointed to revise the curriculum and text-books of rural schools,
(3) that the Provincial Directors of Agriculture should submit the revised text-books to the Imperial Department of Agriculture for advice before their final adoption. (*Ibid*, p. 204.)
59. Nature study is thus one of the surest ways of preparing children for engaging successfully in occupations of rural life, and one of the methods by which this object is attained is by means of school gardens. (*Ibid*, p. 205.)
60. With the aid of a few simple tools, and with a trifle expenditure, every boy ought to be able to make some really useful articles of domestic use such as a shelf or book-case. The labour involved in the work is such as to develop all the faculties of the child, and the child who is able to make a neat book-shelf will have learnt, untaught, lessons of personal intelligence, ability and unselfishness. (*Ibid*, p. 205.)
61. The only course laid open to us is to meet the competitors of the West on their own scale, armed with the up-to-date training in industries and commerce and run our enterprises on large lines. Turn out a large army of highly trained commercial and industrial experts of our own. (*Prof. S. R. Davar*, pp. 224-225.)

62. Therefore, another point, which must be looked to, is the imparting of technical education to our youth with a view to fit them to be leaders capable of organizing and guiding our labour. Our youth must be taught to attach the same value to industrial as to literary education. We must not only look to our Educational Department to supply the want ; the combined efforts of our millowners can do much in this direction. In fact, as far as textile industry is concerned every mill can be a training ground for apprentices. (*Mr. S. D. Sakalatwala*, p. 230.)
63. For effecting the revival efficiently and on modern lines, of Indian navigation, I would also suggest that Technical Schools and Colleges of navigation be established at the principal ports of India, *viz.*, Bombay, Karachee, Calcutta and Madras on the lines of the following well-known institutions of England :—
- (1) Municipal Science, Art and Technical School Devon Port, (teaches Navigation, Nautical Astronomy, Marine Engineering and Nava Architecture.)
 - (2) Municipal Technical School for Fishermen, at Hull, England, (teaches Seamanship, Fishing and Navigation.)
 - (3) Navigation School, Dundee, Scotland.
 - (4) School of Engineering and Navigation, London.
 - (5) The Thames Nautical Training College, London.
(*Mr. M. B. Sant*, p. 236.)
64. In order, to derive full advantage from the training received by our youths in foreign countries it is necessary that students should first be admitted in some factory in India for a short course of apprenticeship and be given there a good grounding in the essential elements of this glass industry and

made fully acquainted with the character and properties of raw materials available in the land and the manner of their present treatment in our factories, together with a practical demonstration of the defects of our older systems and the difficulties under which we labour. They will then be in a proper position to follow intelligently the processes of glass-manufacture pursued abroad and be also able to learn how best to adapt foreign methods to the exigencies of our own conditions. (*Mr. Alack Dhari*, p. 271.)

65. We should have well-equipped laboratories, run on commercial lines where everybody can, on payment of a small fee, have specimens of any material analysed and ascertain its industrial uses. We want consulting chemists, whose vocation it is to find out the nature of defects that may exist in any raw material, and give advice about the manners in which they can be remedied. In the development of all pre-eminent chemical industries, like glass-making, the existence of such facilities has great practical value. (*Ibid*, pp. 274-275.)
66. A master foreman would not be in a position to establish new industry. He must have several years' practical training before he is in a position to be in full charge of any work and this is the reason why we must have our several industries established before hand. (*Mr. A. Tillery*, p. 301.)
67. "All our complex forms of industry involve sometimes in the director's engineering or practical genius, a sort of instinct of the market and a life-long familiarity with an involved mass of considerations partly mechanical, partly monetary, partly administrative. The head of a great production is like the captain of a ship or the general of an army. He must have scientific knowledge, technical know-

ledge, practical knowledge; presence of mind, dash, courage, zeal and the habit of command." (*Mr. W. S. Hamilton*, pp. 307-308.)

The promoters and contributories of the capital of a company must not seek to usurp to themselves the actual managing of the company. That is the separate function of the Manager or the Managing Agent who should have been trained by long practice in the branch of business concerned. Choose your Manager for his special qualifications and then give him as free a hand as possible. (*Ibid*, p. 308.)

To provide the auditors of the future, a special class for accountants, ending in a diploma, should be established in one or more Indian College. (*Ibid*, p. 310.)

If there are to be profit producing companies—whether on a great scale or a small one—the young men of India must obtain the necessary technical knowledge. Those who can afford it should go to Europe, and learn all they can of the jealously guarded processes of the great industries in their own strongholds. They will have to labour hard for their knowledge, for trade secrets are not willingly imparted. For those who cannot afford to go to Europe, there are the lower grades of industry to be filled and a training for them whether as factory manager or as engineer or as expert mechanic or expert factory hand of any sort can be obtained in many places in India. It is an era of specialism in every branch and the insatiable demand for specialists of every grade and in every line must be satisfied if the larger industries of India are not to be starved. Without expert assistance capital must remain dormant or will waste itself in financial cobweb weaving. (*Ibid*, pp. 312-313.)

71. It is no use sending Indians to Europe or to America to learn mining if you have no Indian-owned mines in which to employ them, since the European companies will not encourage them. (*Mr. Thakur Singh*, p. 318.)

D.—Capital and Co-operative Credit

72. The establishment of purely Swadeshi Banks under experienced management and possessing ample capital, is going on in all quarters of India, and there is ample room for more of these institutions for helping on the expansion of industrial enterprise. (*Maharaja Bahadur of Darbhanga*, p. 23.)

73. How to organise Capital.

How to preserve Capital when organised.

For what objects, and under what management, should the capital be organised.

If capital be organised as Finance, where, to what extent and under what conditions it should be directed towards production of wealth.

Should the Foreign Capital be allowed free scope in State and private undertakings.

How could foreign Capital be available for private enterprise.

I am indeed sorry that these matters have not been scientifically dealt with so far, and I humbly direct the attention of the many students of Economics, in the country, to place these subjects in their true light before the people. (*Lala Harkishen Lal*, p. 12.)

74. In this connection, I might venture to suggest both to the people and the Government, the desirability of the people of the Province entering the export and import business; adopting its banking system to help in this direction, and providing transport and storing facilities. (*Ibid*, p. 14.)

75. In every country the tendency is towards factories on a larger scale ; and if India is to take a hand in the game at all it will have to conform to the rules. (*Mr. Frederik Noël Paton*, p. 53.)
76. With the concentration of capital must be associated technical skill, and I hope the leaders of the industrial movement will not make the mistake of thinking that the acquisition of technical skill may be limited to the artisan class. (*Mr. J. E. O'Connor*, p. 100.)
77. But if we ourselves borrow foreign capital for the exploitation of our national resources, the burden of the interest charged thereon will be more than counter-balanced by the profits that will find their way into our pockets and the increase of national wealth that will ensue. So long as no Indian capital is coming forth in the desired quantities, we must borrow cheap foreign capital. But the industries thus financed by foreign capital must be entirely in the hands of Indians. The enterprise and the management must be Indian, all the profits derived therefrom must also be Indian. Let us try by all means to get as much indigenous capital as possible. (*Prof. V. G. Kale*, p. 174.)
78. At present we put all European-managed industries whether coal or gold mines, woollen or jute mills, tea or coffee plantations, in the Swadeshi category, and this is good so far as it goes. But our next step must be to make them genuinely Swadeshi. (*Ibid* p. 174.)
79. The sowcar must be replaced by the Village Bank and the Village Bank must be prepared to supply the best and cheapest artificial fertilizers where natural manures are insufficient, as is the case in all parts of India. (*Mr. John Kenny*, p. 197.)

80. I contend that even at the cost of slower development, European capital should be excluded at least in the native territories as far as Mining industry is concerned. (*Mr. Thakur Singh*, p. 316.)
81. A little mutual help amongst some of our people is all that is needed for the revival of mining industry. (*Ibid*, pp. 318-319.)
82. The prospecting licenses are cheap enough and enormous sums are not required in all cases to keep the mines going, once the mining leases are obtained. In the present state of affairs it is of no use to take an antagonistic attitude towards the European firms in India. What is wanted is to win them over to our side by making use of their capital and business experience. (*Ibid*, p. 319.)

E—Fiscal Policy

83. It behoves those concerned in the many industries of India, and especially the sugar industry, to be prepared for the change should it come about, for on no industry in India would the initiation of a protective tariff have as far-reaching effects. It seems to me of the utmost importance in these circumstances that the industry in this country should take steps to coalesce and frame a definite policy for its guidance. (*Mr. A. B. Shakespear*, p. 133.)

F.—Agriculture

84. For irrigation purposes, these wind-motors, where they could be applied, would be the means of saving to the cultivating classes of an enormous amount of manual labour. The power of the wind and water for driving motors is as yet hardly touched in this country. (*Maharaja Sir Rameshwar Singh Bahadur of Durbhanga*, p. 20.)

85. If agriculture is to be improved, the first measure to be adopted is to lighten the burden of the taxation which it bears. (*Mr. J. E. O'Connor*, p. 95.)
86. The first step to be taken is to reduce the share of taxation which that community pays to the state by treating land like any other form of property subject to the same rate of taxation, no more and no less. (*Ibid*, p. 96)
87. The next thing needed is intensive culture.' At present the land produces really less than half what it would be capable of producing if it were better cultivated. (*Ibid*, p. 97.)
88. The capital is non-existent, but part of it would be supplied if the land revenue were reduced and the other and larger part would be supplied if capital could be concentrated in Banks and supplied to the cultivator as is done in agricultural countries in the West, as for instance Ireland, Canada, the United States, at a moderate rate of interest. I commend this point to the gentlemen interested in industrial development. Let them take steps to found a Bank with numerous branches for the special purpose of advances for agricultural improvements. (*Ibid*, p. 97.)
89. What is needed is that the agriculturist should know the scientific reasons on which he unconsciously bases his practice—for his practice is in fact applied science, that he should learn the theory of his trade like the engineer, the builder, the sailor, and every other artisan. (*Ibid*, p. 98.)
90. It is quite certain that no important improvement can be looked for in field yields unless the manure supply can be augmented, and it is for this reason that I attach much importance to the working up of oil seeds in India instead of exporting them to foreign countries. (*Mr. A. B. Shakespear*, p. 133.)

91. In fact, with such potentialities lying before her staple crops, it seems that India could well afford to go almost any length to retain her fertilizers in the country. (*Ibid*, p. 133.)
92. India is essentially an agricultural country. Devote all your energies to its improvement ; develop it to the highest degree attainable. Foreign manufacturing countries will require food, they will want raw materials, and must look up to you for the supply of the same. (*Prof. V. G. Kale*, p. 163).
93. The development of agriculture, is therefore, a very important direction in which we must make serious efforts, if not for the purpose of increased exports of food and raw materials, at least for the sake of meeting the growing demand for the same in the country itself. One of the causes that have been assigned for the high prices of food-grains prevailing at present is that the production of these grains has not been keeping pace with the increasing demand for them. Again, agricultural improvement is essential for the growth of the manufacturing industry. Let us take the sugar industry as an illustration. (*Ibid*, pp. 166-167).
94. Educated people and Jamindars must co-operate with Government in this matter and not leave the poor and ignorant ryot to his own crude efforts. (*Ibid*, p. 167.)
95. The material prosperity of the country must first be aimed at. India is almost entirely an Agricultural country and the foundation for political freedom can be laid deep only if the state of the peasant is improved. (*Mr. John Kenny*, p. 197).
96. The need of India is manure. There is an insufficiency of cattle manure, and artificial fertilizers must be introduced. But this wants money and

money can be placed at the disposal of the Indian peasant only by means of Rural Banks. Will true patriots once wake up to what their country wants of them ? (*Ibid*, p. 199.)

G.—Other Industries.

97. In this connection, I might venture to suggest both to the people and the Government, the desirability of the people of the Province entering the export and import business ; adopting its banking system to help in this direction, and providing transport and storing facilities. (*Lala Harkishen Lal*, p. 14.)
98. The Fisheries of India surely ought to be an industry that ought to receive every encouragement. (*Maharaja Sir Rameshwar Singh Bahadur*, p. 19.)

There is still plenty of room for expansion of this jute manufacturing industry for we have still to export one-half of the jute crop as raw material. The forty jute mills on the banks of the Hooghly have all been erected under European supervision and all are managed by European firms. Would it not now be possible for Swadeshi enterprise to take part in such an industry ? I think there is ample room for such. (*Ibid*, p. 19.)

Our Coal stores underground are of a practically inexhaustible nature and if these undeveloped resources along with the other mineral wealth of the land such as iron, manganese, mineral oil, etc., etc., are to be exploited by the sons of the soil, no time should be lost in encouraging the educated youth of the country to specialise, in the departments for which they are fitted, for their future work. (*Ibid*, p. 19.)

For the beautiful designs of drawn thread work on cotton and linen cloth, the supply is not nearly equal to the demand, and the beauty of these indus-

tries is that they can be made by the people in their own homes. Hitherto no systematic efforts have been made in getting the producers of these articles into touch with foreign customers, who would be only too anxious to purchase them if they were afforded the opportunity. And the same observations apply to the indigenous artwares in metal, the wonderful carvings and the miniature paintings on ivory, which would find a greatly increased sale if they were only brought into contact with the customers. (*Ibid*, p. 21.)

102. There are a great many goods which we still import that can in due time be made by ourselves. And why should we export such products as cotton seed, when we could export the extracted oil, and enrich the land with the refuse ? (*Ibid*, p. 22.)
103. I am convinced that at least a portion of this drain on the finances of India might have been saved, if more attention had been given in the past to the encouragement and development of the indigenous arts of mining and metallurgy; for it is quite possible that, with less wasteful methods of smelting and the use of simple machinery, and above all with the assistance of intellects of a higher order than the uneducated classes, whom the industry was left, could be expected to possess, many of the low grade ores of copper and other minerals, which are now found to be worthless for exploitation on western lines, might have continued to be productive if worked by improved native methods (*T. H. D. La Touche*, pp. 82-83.)
104. There are hundreds of petty industries which our village communities may go in for by themselves and by an intelligent system of co-operation, transport all their products to the market, and village industries may be carried on quite effectively in

this province (Punjab). (*His Honor Sir Louis Dane, the Lieut.-Governor of the Punjab*, p. 30.)

105. The reply is that the Indian spinners must imitate their competitors in the far east. They must combine. (*Frederick Noel Paton*, p. 37.)
106. The syndicate (of spinners) may agree from time to time what quantity of yarn is to be shipped to a given market ; and each of the three participants is under an obligation to contribute his quota at the price agreed upon. (*Ibid*, p. 38.)
107. It is easy to see that the comparatively large quantity of yarn marketed in this way under one set of tickets while the market is active, quickly makes the goods familiar to every buyer and user and obtains for them a recognition and popularity much greater than could be secured by the same quantity of yarn under a number of different tickets. It is still more obvious that when the market is in a depressed or neglected state a relatively small quantity of yarn, if it bears a well known mark, is, even when widely distributed, much more effective in keeping its hold on public notice and favour than a larger aggregate quantity when presented under a variety of marks not one of which is universally recognised. (*Ibid*, pp. 38-39.)
108. As one example of combination in the production of a manufactured article, I may instance the cotton seed industry in which, as I know, a good many of you are taking a lively interest. I think it is recognised now that in this country cotton-seed oil will find its best market in the form of what are called edibles—ghi substitutes and oils for cooking. (*Ibid*, p. 40.)
109. If the establishment that conducts the refining processes is also to crush the seed and make the crude oil, then vast quantities of seed must be brought to it.

It will first have to pay inward freight on that seed and will thereafter probably have to pay outward freight on the cake. The cake represents the bulk of the material, and would have to be redistributed to centres where there existed a demand for fodder and manure. A third form of waste would attend this procedure, inasmuch as it would afford no employment for the motive power now latent in those ginnery engines which stand unused during a large part of the year. All these difficulties are overcome if the crushing is done at the ginneries and if only the crude oil is sent to the refinery, the cake remaining in those places where the crops are to be manured and where large numbers of cattle are maintained both for cultivation and for transport. (*Ibid*, p. 41.)

110. From the facts already stated it follows that the company that proposes to refine and to make butter substitutes must, in the beginning organise combination and co-operation between itself and the ginneries. It is necessary to select, as the site of such a pioneer refinery, as is in question a district or tract that contains a number of ginneries likely to co-operate by installing crushing machinery, working it in the off-season, and marketing their own cake. The next step is to decide on what scale the refinery is at first to operate, and to fix the quantity of crude oil to be treated. The third step is to establish a working arrangement for a series of years with such numbers of the adjoining ginneries as could furnish that quantity of oil without fail. There are certain places in India where it would be convenient to adopt the American practice of pumping the oil through pipes from the crushing mill to the refinery. (*Ibid*, pp. 42.)
111. In any such arrangement it would probably be necessary to lay down the minimum quantity of

crude oil which each crusher was to furnish to the refinery and the maximum quantity which the refinery should be bound to take over from each crusher. The simplest form of combination in such a case as this is that in which the so-called manufacturers agree to put in crushing plant of a certain capacity and further to take up in whole or in part the joint capital for the installation of the refinery. It is however sometimes found more convenient at a later stage that there should be no actual relationship between the manufacturers and the refiners beyond that constituted by the terms on which the crude oil is to be produced and supplied. (*Ibid*, pp. 42-43.)

112. The point to be brought into prominence at the present time is that unless we can develop a certain power of combination amongst ourselves, the establishment of a large cotton seed industry on a basis of most economical working remains in the air. (*Ibid*, p. 43.)
113. It is necessary in the circumstances that capital should be employed upon the manufacture of the article which are used by the people at large, not upon the articles which are used by the few. There is a wide field for the extension of cotton manufacture, to begin with. Then there is the manufacture of the tools and apparatus to which I have already referred. Ploughshares should be made in factories as elsewhere, and could be made more cheaply, and beam of the plough might also be so made. So with the hoe and the kurpi. The metal utensils should be made in large factories, for already the hand-made vessels are being supplemented, and will presently be superseded, by machine-made metal vessels imported from abroad. Take again the leather articles which

are required by the mass of the people. If they could get cheap shoes their use would be greatly extended, widely as they are used at present. Women in particular would soon take to the use of shoes of elegant make though cheap instead of going barefoot or in clumsy slippers as at present. Then again there is room for earthenware factories in which could be made more neatly and cheaply the articles now clumsily finished, though of good design, by the potter. In this country, Doulton's and other companies make their principal profit out of common articles of universal use. There is also an excellent opening for the profitable manufacture of sugar, which is so widely consumed in India. (*Mr. J. E. O'Connor*, pp. 100-101.)

114. The textile industry is making a commendable progress, but we want cotton of a finer quality to be produced in the country and this also points to improvements in agriculture. (*Prof. V. G. Kale*, p. 167.)
115. Our tobacco industry is also handicapped by the poor quality of the stuff we produce. The same remark applies to other agricultural products and industries depending upon agriculture. Here then is a vast field for work. The greater the value, we may coax mother earth into yielding to us, the better will it be for the poor cultivators and the country generally. (*Ibid*, p. 167.)
116. The hand-loom industry has been the national industry of India since ancient times, and no effort should be spared to enable it if possible to complete successfully with the power-loom. (*Mr. A.N. Datar*, p. 192.)
117. We may surely aspire to supply some of our main wants by indigenous manufactures by giving a new lease of life to old industries and starting new ones.

Instead of sending all our raw materials to foreign countries to be manufactured there, and returned to us as finished articles, we may be able to manufacture our own goods and pocket all the profit that goes at present to other people. By manufacturing locally articles for which we enjoy special facilities, and exchanging them for such as we cannot make with advantage, we shall profit ourselves and contribute an economic gain to the world. • (*Prof. V. G. Kale*, p. 170.)

118. As regards foreign market, every effort should be made to keep hold of those already established by supplying uniformly (cotton) goods of a superior class, whilst a systematic effort should be made to push goods into new markets, adapting ourselves to their standard. (*Mr. S. D. Sakalatwala*, p. 227.)
119. Instead of frittering away their energies in thrusting worthless imitations on the market, it would be far better for themselves and the industry, if their energy was directed towards the improvement of their own goods which could then stand on their own merits. Why can our mills also not specialize, certain mills supplying certain lines only? Such a policy, as is now followed, may bring profits for a short while to particular concerns, but in the long run is bound to spell ruin for the industry generally. The same may be said of short-reeling in spinning which has already tarnished the good name—if ever there was one—of Ahmedabad yarns. (*Ibid*, pp. 227-228.)
120. Honest Swadeshiism has widened the scope of our home industry and our main object must be to create a demand for homemade in place of foreign goods by supplying articles of equal quality at a slightly lower rate. If we are to drive away in a great measure our rivals from the field, the products

of our mills must be of a better texture and finish and greater attention should be given to up-to-date methods of dyeing, bleaching and mercerising. (*Ibid*, pp. 228-229.)

121. Our industry has now grown to such an extent that we cannot employ European experts in sufficient numbers without incurring a pecuniary loss. If we cannot yet dispense with them wholly, let us yet make an effort to supplant the majority of them and keep the money spent on them in the country. Surely we have had enough experience in the line to be able to dispense with a few foreign experts, who in spite of their technical knowledge are ignorant of local conditions. (*Ibid*, p. 230.)
122. Let there be men thoroughly acquainted with the details of the industry and possessing the necessary qualities of organization and there will not be such a complaint of want of enterprise. It must be said that though there is a vast scope for the expansion of our industry as is apparent from our import trade, it would be well to improve and make stable the present concerns, and train workmen whom the limit imposed by the new Bill on working hours will surely attract. (*Ibid*, pp. 230-231.)
123. Finally what is of greater importance still is, those who would be at the helm of the industry as its trusted captains, must be men not only of ability but of honour and integrity, who have in view not merely a certain amount of profit, but the furtherance of the industry, and the improvement of the methods and men employed therein. (*Ibid*, p. 231.)
124. Attention must also be paid to the cultivation of cotton. We are more favourably situated with regard to our raw product than our rivals, but hitherto we have not taken full advantage of our

opportunities. Every attempt must be made to improve the quality and quantity of our raw product. The present situation of the American cotton market ought to urge us on to find means to be independent as regards price of the American market which seems to be guided not on natural principles of demand and supply, but mainly depends on the prevailing speculative elements. Efforts are made by the Agricultural Department but these ought to be adequately backed up by private enterprise supported by the local mills. (*Ibid*, p. 231.)

125. It is absolutely essential for the stability of the industry that substantial reserve funds should be built up. (*Ibid*, p. 231.)
126. Let us then hope, men will not be wanting, who will rise to the occasion and prove themselves equal to the task of remodelling our textile industry on modern lines, and thus assure its future prospects. (*Ibid*, p. 232.)
127. It may not perhaps be possible to raise in India sufficient capital to pioneer new Railway lines for the present ; but there is no reason, why there should be no expansion of shipping industry at important ports, like Bombay, Karachi, Calcutta and Madras, on modern lines. (*Mr. M. B. Sant*, p. 235.)
128. There is undoubtedly room for the employment in India of small portable machines for match factories on the Japanese plan, these being carried about from place to place in the vicinity of the forests. Japanese methods have recently been studied by more than one Indian gentleman, but hitherto these methods have not yet been subjected to any extensive trial in India. (*Mr. R. S. Tronp*, p. 124.)
129. Match factory sites should usually be on or near a railway, navigable river, or other main line of com-

munication, and should be situated either near the forest or else on a floating stream, for it should be remembered that water transport is the cheapness of all methods of conveying timber, while for purposes of match manufacture, the wood itself remains fresher and in better condition if kept in water than if kept for any length of time in a dry state. (*Ibid*, p. 127.)

130. If the match industry in India is to reach the importance which it should do, it is necessary that the qualities of matches manufactured should be of a high order ; cheapness of production ought not to be a bar, considering the comparatively low rate of labour and the abundance and cheapness of suitable wood in some of the provinces. In this connection competition between Indian manufacturers is quite uncalled for at present. (*Ibid*, p. 128.)
131. Their most advantageous course of action would be to combine where necessary in obtaining good expert advice and assistance with a view to improving the quality of their matches, for it is only by such means that there can be any fair prospect of overcoming the severe stress of foreign competition. (*Ibid*, p. 182.)
132. If things go on at this rate uncontrolled, it is very likely that sometime there will be a world-wide shortage of tanning materials. Rich as the tropical countries are in their vegetation, it may be expected that much of the demand for tanning extracts will have to be met in future by the establishment of tannin extract factories in the heart of the forests of India and Burma, Strait Settlements, Borneo, Java, etc.—forests that are beyond doubt enormously rich in tanning materials. (*Mr. Puran Singh*, pp. 239-240.)

133. So far as I am aware, practically no advantage of this enlightened policy of the Government has yet been taken by the people and no steps have been taken by the latter to develop this industry, which promises to be one of the most flourishing industries of India. It is high time, therefore, that the Indian capitalist took time by the forelock and seized his opportunities in this direction. (*Ibid*, p. 240.)
134. Simultaneously with the manufacture of katha, the writer is of opinion that a good light-coloured tannin extract can be prepared as a by-product from the wood, but the operations will have to be carried on a much larger scale than is at present done, with up-to-date machinery. Under proper conditions a product almost like Gambier, a tanning material much in demand, can be prepared from this tree. (*Ibid*, p. 244.)
135. The bark of the tree is also capable of yielding a good tannin extract. (*Ibid*, p. 244.)
136. It should be noted here that when this profit is yielded by the treatment of chestnut wood with 7-10% of tannin under European conditions of highly paid labour, there is every reason to believe that a factory working under the cheaper labour conditions of India would yield a still greater margin of profit. (*Ibid*, p. 251.)
137. With a capital expenditure of Rs. 50,000 on the plant, an extract factory can be started which should be able to turn out a minimum of 1 ton of finished extract per day. (*Ibid*, p. 251).
138. But if glass-making industry on modern lines is actually to develop in India on a large scale, the manufacture of sodium carbonate from Indian salt or *reh* should be undertaken at once and considering the predominant part which carbonate of soda plays in many important industries, and the incen-

tive which its local manufacture and consequent cheapening of cost would give to them, our Government or some enterprising Indian prince may well take-up the question of the development of this branch of industry and start on their own account, some soda-making works or subsidise soda-making industry on some substantial basis. (*Mr. Alakh Dhari*, p. 276.)

139. In order to explain the extensive range of its uses I may mention that the carbonate of soda forms an essential constituent in the manufacture of soap and paper, in refining oils, in spinning and weaving of cotton, in tanning and curing of leather and in the process of extracting aluminium from its ore, and in all important and growing industries. It reflects a great reproach on our country's industrial enterprise that such an important industry should be left undeveloped. (*Ibid*, pp. 276-277.)
140. We possess such mighty mountain ranges and such large rivers, that several sites can be found where at least a part of the energy can be well employed. In the case of some rivers, the same stream of water can be made to create energy at two different places. (*Mr. Sheo Narayan*, p. 290.)
141. The other Indian Offices (Life Assurance have managed to copy their figures, almost *mutatis mutandis*, and commenced to issue Policies. This course of conduct is not only unsafe but positively dangerous and it is time our offices took immediate steps to requisition the services of some English or American Actuary, duly qualified in this art, not forgetting in the meantime to induce some of our countrymen to go to these countries and receive their training in this science. (*Mr. Narain Das*, p. 298.)

142. Life assurance is a branch of knowledge to which no attention has, till now, been given either by the Government or such popular institutions as the Society for Promotion of Technical Knowledge among Indian Students. This is more important than Tanning, Glass-making, Dyeing, Textile Mechanical or Electrical Engineering, Sericulture, Agriculture or other industries in so far as no single business has ever wielded so much influence, on the public weal or woe of a nation. (*Ibid*, p. 298.)
143. Only if we work on the right lines we are sure to find in Insurance Business in this country a huge reservoir of power, wealth and influence. (*Ibid*, p. 300.)
144. I consider that the only means of saving the present situation is that we should set to work every square foot of mining ground still available within India. Some of the wealthy native citizens with the aid of the Indian chiefs should for this purpose form themselves into syndicates. (*Mr. Thakur Singh*, p. 318.)
145. We must try to secure what little remains of the Manganese; like coal it has also drifted out of our hands. If we could start prospecting at once, there are still some deposits left in various places, for instance in Dharwar, Belgaum and other places. (*Ibid*, p. 320.)
146. The Iron deposits have not yet been touched to any appreciable extent. The iron ores of India differ from those of Europe and are somewhat refractory to the methods of smelting at present in vogue, which have been devised for ores of a different character. This difficulty can be overcome if some little attention and study is given. (*Ibid*, p. 320.)
147. Concessions from Indian States ought to be secured wherever minerals of good quality are found. (*Ibid*, p. 321.)

H.—Exhibitions.

148. Exhibitions have done much in this country for showing what India can do in the industries to which I have referred; but I would humbly suggest that much more could be done with the help of our Department of Commerce and Industry. If arrangement could be made to have small museums of the products of our industries in art wares, fabrics, etc., attached to the British Consulates in foreign countries, with catalogues and prices, I am sure a great impetus would be given to our indigenous productions, which would greatly stimulate them and enlarge them to the increased wealth of the producers. (*Maharaja Sir Rameshwar Singh Bahadur of Darbhanga*, p. 21).
149. Germany has for sometime past had floating museums of her products, visiting all the likely ports in the world. These ships show off the samples, give the prices and the names of the manufacturers, and book orders. These floating museums have been a great success in increasing the foreign trade of Germany. When Great Britain adopts the same plan, I trust that India will not be unrepresented in the venture. (*Ibid*, p. 22.)
150. *The suggestions respectfully submitted for consideration may be thus summarised :—*
- (1) The formation of *Trade Museums* at all the provincial centres and in the Presidency towns as also *one central museum for all India*.
 - (2) The publication of descriptive catalogues and hand-books both in English and the principal Vernaculars regarding the more important economic products and manufactures of the country.
 - (3) The institution of *special inquiries* in the Department of Commerce and Industry at each exhi-

bition with a view to ascertaining the requirements of foreign trade in Indian articles.

- (4) Collection of *samples of foreign manufactures* and supplying *information* in relation to them—the methods of manufacture and the machinery employed—to the *native manufacturers*; *one or two industries to be selected* for such treatment *at each exhibition*—industries for which India possesses special facilities.

Much work has to be done on the same lines in regard to *mining*.

- (5) Request to Government this year to place Mr. Hadi and Mr. Dutt on *special duty*, one in connection with sugar refining and the other in regard to mining who should visit the various Provincial centres with a view to dissemination of a knowledge of the newer methods amongst the people.

As regards art work, organisation of—

- (a) *Local Museums and Local Committees* } at the centres of art manufacture.
- (b) *Provincial Museums and Provincial Committees* } with a view to a comprehensive effort.
- (c) *Moveable Exhibitions*—In foreign countries with a view to promote a wider appreciation of Indian Art work.
- (d) The formation of a bureau of Indian Arts under the direction of the ministry of Commerce and Industry to have the care of all this work. (*Honorable Rao Bahadur Ganesh Vyankatesh Joshi*, p. 279.)

I.—Weights and Measures

151. The evils of having diverse standards throughout the various Provinces and Districts are manifest to

all who buy and sell, and who have ever to translate one standard into its equivalent in another. Perhaps, if I may make such a suggestion, it might serve a good purpose if this Conference were to appoint a small select committee to consider the whole question of standardisation and to report at the meeting of the Conference next year what in their opinion ought to be the best means of gaining the end in view. At present it seems to be almost as difficult to get a people to change their weights and measures into a Universal Standard as it would be to get them to change their language. (*Maharaja Sir Ramshwar Singh Bahadur of Darbhanga*, p. 23.)

152. The standardisation of weights and measures is one of the most important problems which lies before the commercial development of the country. The Government of India have already taken steps in this direction and a good many years ago passed an Act for the regularization of weights and measures
* * * * * If the result of the deliberations of the Conference is to appoint a committee, as the Maharaja suggests to further consider the subject and bring it prominently to the notice of the public, I am sure that that result will be of the greatest benefit. (*His Honor Sir Louis Dane, the Lieut.-Governor of the Punjab*, p. 29.)

J.—Miscellaneous

153. A united effort to secure the greatest possible material prosperity in the land is honorable labour for the Mahomedan and the Hindu alike and for the official and non-official equally. Commercial and industrial co-operation spreads out its protecting and fostering wing of national prosperity without regard to sectarianism. (*Maharaja Sir Rameshwar Singh Bahadur of Dharbhanga*, p. 26.)

154. The close examination of the articles kept in the Franco-British Exhibition further disclosed the fact that the best valued articles were those in which land, *i.e.*, the raw material, played lesser part than the labour expended ; and capital required for plants was also not prohibitive. These are conditions favourable to the circumstances of India. But there were certain facts brought home which do not at present exist in India, but which, if effort be directed in that channel, could be easily established. These facts were, knowledge of proportion and designing, power of organisation, and agencies for marketing. The message that the Franco-British Exhibition sent to us amounts to this : Don't lose heart ; look up and adapt yourself to altered conditions. There is nothing that nature has denied us ; and nature has not doomed us to live eternally under the law of adversity. (*Lala Harkishen Lal*, p. 13).
155. We produce already an enormous surplus of raw agricultural products, but those agricultural products unfortunately leave the country and it is my earnest desire, and I hope it is the desire of all of you that we should do something to enable us to work up those agricultural products in the country itself and so enrich all classes of the community. (*His Honour Sir Louis Dane, the Lieut.-Governor of the Punjab*, p. 28).
156. It is obvious that to secure a generally good product, the consumer must be educated as well as the producer, and the first step is the production, by various reforms, of a better article which will appeal first to the better class of consumer and will gradually become acceptable and available to others. (*Sir. F. Nicholson*, p. 62).
157. It is our manifest duty under these circumstances to ward off the evil day as long as possible and to

exercise the utmost economy in the utilisation of the irreplaceable fuels at our disposal. Development in this direction may be said to have proceeded along two main lines: (1) Improvement in the efficiency of the various types of heat engine now in use, and (2) centralization of power generation. Improvements along the first line have been mainly due to a general diffusion among engineers of a knowledge of the science of thermodynamics, while centralization of power generation has been rendered commercially feasible by the development of electrical methods of power transmission and distribution. (*Dr. Alfred Hay*, p. 112.)

158. We are thus led to conclude that in the development of industrial enterprise, which depends on the possibility of a cheap supply of power, electric power transmission is destined to play a very prominent part. (*Ibid*, p. 113.)
159. Alcohol could be most cheaply manufactured from potatoes, and if it is destined to play any large part in the world's future power supply, the cultivation of potatoes is bound to increase to a considerable extent. The corresponding type of power house would contain large alcohol motors driving electric generators, the power being transmitted and distributed electrically. (*Ibid*, pp. 114-115).
160. Water-power and irrigation schemes will go hand in hand, and cannot fail to re-act most favourably on the agricultural and industrial development of India. (*Ibid*, p. 116).
161. Any genuine development of the æsthetic must come from the Indian people themselves. This is no doubt true of all healthy national growths, but doubly so with regard to that somewhat transcendental subject—Art. It seems appropriate that this should be borne in mind at a time when

the more materialistic industries are receiving so much earnest and thoughtful attention. (*Mr. Percy Brown*, p. 123.)

162. The general impression that a study of the indigenous industries, old and new, leaves on one's mind is, to put it briefly, that it is an unequal fight in which we are engaged. But fight we must. The cessation of efforts would be suicidal. * * We are slowly but steadily progressing. But we have got to realise what is exactly the situation in which we are placed and what is the nature and extent of the obstacles we have to surmount. An easy-going optimism is not better than a despairing pessimism. The situation must be rightly understood before we essay to face the odds that are against us. And however gloomy the prospect, we must work with a singleness of purpose and a firm faith in our destiny. (*Prof. V. G. Kale*, p. 163.)
163. We may, indeed try, if possible, to avoid the evils that have been disgracing industrialism in the West. But we cannot remain where we were or what we are. We must advance, we must imitate, we must assimilate. (*Ibid*, p. 165.)
164. The spread of primary education, the establishment of co-operative societies and agricultural banks, the diffusion of useful information regarding improved methods among the ignorant peasants, the supply of better manures and more extended irrigation works, are the directions in which effort has to be made. (*Ibid*, p. 167.)
165. India as we all know is pre-eminently an agricultural country. But she cannot afford to be content with being merely agricultural. With cheap labour and the untapped resources of the land she ought to take her proper share in the manufacturing industries of the world. With the reduced productive

power of labour in agriculture and the teeming millions of population at her command she is well fitted to organize and develop industries. (*Mr. A. N. Datar*, p. 178.)

166. For the diffusion of naval training among khalasis, other sea-faring classes and the general public, important works on the theory and practice of navigation, should be translated into the principal Vernaculars of India. (*Mr. M. B. Sant*, p. 236).
167. The existing Translation Societies, like the Deccan Vernacular Society of Poona will confer a great boon on the educated public, if they set aside a certain sum every year, for translations of Technical and Scientific treatises on naval and technical subjects, instead of selecting old classical authors whose works do not possess in the eyes of the present commercial world, any value beyond mere academical interest. (*Ibid*, p. 236).
168. Educated men also should undertake the translations of such works, instead of frittering away their energies in writting works of fiction. (*Ibid*, p. 237).
169. A minor cause of distrust is the exorbitant commission sometimes allowed to brokers or Managing Agents. Commission should be on profits, not on sales or purchases. (*Mr. W. S. Hamilton*, p. 308).
170. The powers of shareholders, if they will only act as a corporate body, are really very extensive. For information they are entitled to inspect the records of the companies prescribed by law and they can see the returns made to the Registrar of Joint Stock-Companies : if one-fifth of them can agree together they can have the affairs of the company examined by a Government Inspector : they can refuse to pass a balance sheet which does not truly represent the financial position of the company : they can refuse to ratify any unsatisfactory contract made by

the promoters of the company with any agents or others and they can set side any arrangement made by the directors which is not to the company's advantage—whether it be the appointment of Managing Agents or brokers or any other contract—even though the Articles of Association authorize the directors to do all such acts as could be done by the company in general meeting. These powers are very real : let shareholders rouse themselves and use their powers. (*Mr. W. S. Hamilton*, pp. 309-310.)

171. To my mind the reform that is needed beyond all others is that Government should lay down by whom accounts may be audited. (*Ibid*, p. 310).
172. In England balance sheets are audited by Chartered Accountants. Of these—there are not many in India at present, but there are a few and I would suggest that no one but they and one or two qualified Indian Accountants certificated by Government should be permitted to audit accounts. (*Ibid*, p. 310).
173. Again a prospectus—or a return in lieu of a prospectus—should be obligatory, as it is in England. In it a mass of information is given which enables the investor to know a good deal more about his company than is now possible in India. Amongst other things the prospectus must shew the minimum subscription on which the Directors may proceed to allotment. (*Ibid*, p. 310.)
174. Let the Mahajans or the landowners form a society by contributing shares, let them invite the weavers to contribute their small shares, let them buy warping machines, looms and yarn, let them lend them out to the weavers and pay the weavers at fair rates for the cloth produced—with it may be a bonus out of the annual profits—and then let them place the finished goods on the market. (*Ibid*, p. 310.)

175. Could not a Co-operative Society be formed to organize some industry by which these poor women could help themselves? It has been suggested that the knitting of socks and vests and the like is a work they will and can undertake. It is respectable and sufficiently easy. Here then is a chance for capitalists to unite and buy knitting machines, hire them out to the women on the hire purchase system, collect the knitted goods and place them on the market. The society would earn its profits both by the sale of the machines and by the sale of the manufactured goods; and the principle of co-operation and the energy of the workers would be maintained by paying the women a share of the profits as well as wages on the piece system. (*Ibid*, pp. 315-316.)

K.—Sugar Industry

176. But in order that you may perceive the force of the contrast I may promise that centralization has been and is increasingly the keynote of all successful enterprise in the modern cane sugar industry, and that centralization in this connection has a somewhat special meaning. It means not only the replacing of numerous small appliances by relatively few establishments of sufficient size to insure economical working and to support the cost of expert supervision. It means still more the concentration of the cane fields in the immediate vicinity of the factory. (*Mr. F. Noel Paton*, p. 47.)
177. If the Indian sugar industry is to be saved, the measures will have to be drastic and prompt; and an association often accomplishes much more with a steadily growing constituency holding sound and homogeneous views than with a large and dissident membership incorporating everything that is uninformed and irreconcilable, (*Ibid*, p. 54.)

178. We cannot hope to secure much greater concentration of the crop : to accomplish this contemplates a revolution in the agricultural methods of the people. We must, therefore, deal with the cane crop as at present sown. It is evident that in the first place a factory for the direct production of refined sugar must ensure to the man who grows the crop as good a price as he gets at present from the conversion of his cane into raw sugar. (*Mr. A. B. Shakspear*, pp. 131-132.)
179. There is a tremendous amount of room for improvement even in these individually small operations, and the spread of the co-operative movement in other directions should be taken advantage of to encourage groups of cultivators to adopt appliances and methods of greater efficiency. (*Ibid*, p. 132.)
180. In the more condensed tracts, sufficient supplies can undoubtedly be collected for factories treating 300—350 tons of cane per day, but to render this possible, mechanical transport is, in my opinion, essential, not only to cheapen transport costs but to ensure cane reaching the factory in good condition. The resources at present available to the cultivator for bringing his cane to the factory are bullock carts, which is a slow and very costly method of transport and would never sustain a factory's requirements. A system of light tramways following the main roads of the district, and radiating from the factory for distances corresponding to the capacity of the plant, is in my opinion necessary if a modern factory is to be effectively and economically served with cane supplies. (*Ibid*, p. 132.)
181. Unless we at the same time move forward systematically in the improvement and cheapening of our sugar, we cannot hope to secure a really sound

foundation for the industry in this country. (*Ibid*, p. 134.)

182. But we are told that unless we adopt the central factory system, which has proved such a success in Mauritius and Formosa, our prospects must be anything but cheerful. (*Prof. V. G. Kale*, p. 162.)

L.—Fishes

183. Public hygiene demands for the individual and for the community alike and in the common interests of both, that food should be of the best and safest quality obtainable, and should at least be above the suspicion of favouring, if not begetting, disease; increasing wealth among many sections develops a more fastidious taste in food and a craving for new flavours and foods together with the ability to pay for them; a population rapidly becoming dense demands more food and more nutrient food. (*Sir F. Nicholson*, p. 60.)
184. To sum up; we have in this Madras Presidency an ancient industry employing a large population but primitive in its methods from catch to sale; knowledge and capital, energy and organization, introduced as much as possible by private enterprise, are necessary to improve the old and develop new methods in such wise as to ensure that the present catches shall all be turned into wholesome food; that these catches shall be gradually augmented, as the fisher folk show capacity to deal with them, so as to assist in feeding a growing population; that fish which for any good reason cannot be turned into direct food shall, after the expression of their oil, be turned into high class fertiliser for the benefit of *Indian* soil; that fish waste shall be utilised to the utmost possible extent; and that these developments shall be carried out as far as possible through and for the benefit of the existing fisher folk and

curers, and by means, on the Government side, of a carefully devised general and technical education—and other assistance—in which demonstration through experimental stations, fixed and peripatetic, shall play a chief part. (*Ibid*, p. 76.)

185. The whole of this mass of food and fertiliser would be pure gain to the country and especially to the working classes, while various by industries, which there has been no space to discuss, would accompany the development; such industries are those which relate to boat building, machinery, the pressing and refining of edible vegetable oils, the production of vinegar, pottery, refrigeration, co-opering, pearl button making, tin plate working, etc., to say nothing of increased traffic and business dealings. (*Ibid*, pp. 76-77.)
186. The best thing would be to employ country fishermen to fish those tracts (far off tracts) and bring the fish in motor boats fitted with refrigerators. Moreover these motor boats can take provisions, water and other necessities to the tracts for the fishermen when going on their outward journey. The number of such carrying boats should be large enough to bring sufficient fish daily for all the chief markets. It has been determined conclusively by experimental fishing in the more distant uninhabitable tracts of Sunderbans and those near the seaface that the fishing possibilities and the yields are more than the demand. Now if a Company be floated to work the fisheries in these tracts on the lines sketched out above, it is bound to be very profitable with good business returns and at the same time the scarcity of the fish will be greatly removed. (*Mr. S. N. Das*, p. 143).
187. It should be remembered as pointed in the case of fresh water fishculture, that when the fish grow in

size, some of them must be removed for the healthy growth of the rest. Then it comes to the thing that also some revenue is derivable from the arrangement for helping the growth of the fish which does not entail any expense at all beyond catching the fish for market. (*Ibid*, p. 144.)

188. I may note that to run a commercial fishing concern in the Bay it is necessary that a fleet of at best 5 trawlers should work together and the catches brought to Calcutta daily on motor boats of small draft fitted with refrigerators from the seaface. (*Ibid*, p. 147.)
189. It would be more profitable in that case to convert these coarse fish into manure. The livers can be submitted to some peculiar operations to extract oil. The sounds can be made into isinglass so it appears essential that a factory should be established to have the by-products of fish in order to make a fishing concern commercially successful. It may also happen that the supply of fish is far greater than the demand. Such being the case, it is also desirable to have a curing yard established along with the trawling business so that instead of selling the fish at a very low prices, it would be more profitable to "save the life" of the surplus fish by salting, smoking, canning, and to keep them for bad season or export them to different places where there is a demand for such fish. (*Ibid*, p. 147.)
190. The offals of the fish, their heads and the fins, &c. which are separated before curing the fish, may be profitably converted into powdered manure. (*Ibid*, p. 147.)

**Resolutions passed at the Fifth Indian Industrial
Conference held at Lahore, on the
30th December, 1909.**

I. Death of Mr. R. C. Dutt.

Resolved—That this Conference places on record its profound sorrow for the sad death of its first President, the late Mr. Romesh Chandra Dutt, C. I. E. The Industrial movement has lost in him one of its ablest and most zealous champions, and the country, one of her most accomplished, earnest and patriotic sons. That this Conference authorizes the General Secretary to convey the above Resolution to the widow and son of Mr. Dutt.

II. Purchase of Stores by Government Departments.

Resolved—That this Conference thanks the Secretary of State and the Government of India, for the orders, which have been recently issued in regard to the purchase by Government Departments of articles, made in India, in preference to those of foreign manufacture. The Conference while recognising the fact that these orders mark a distinct advance in the policy of Government towards the encouragement of indigenous industries and manufactures, is of opinion that the report of the Committee be published for general information and guidance in the future.

III. Technical and Industrial Education.

Resolved—That this Conference regrets that the proposal of the United Provinces Government for the establishment of a Technological College at Cawnpur, which was supported by the Government of India, has not been sanctioned by the Secretary of State. In view of this fact this Conference reaffirms the Resolutions of the

previous Conferences on Technical and Industrial Education and again urges :—

(1) that the Victoria Jubilee Technical Institute of Bombay, and the College of Science at Poona, be enlarged so that they may between them supply for the Presidency of Bombay technological instruction in all the branches of mechanical and chemical industries ;

(2) that the Government of India may sanction the proposal of the Government of Bengal to add classes in Industrial Chemistry to the Sibpore Engineering College ;

(3) that the Government of Madras will be pleased to give effect to the recommendation of the Ootacamund Industrial Conference that the Madras College of Engineering should be expanded into an Institute of Technology ;

(4) that the Secretary of State might accord early sanction to the proposal of the Government of the United Provinces that a College of Technology should be opened at Cawnpore ; and

(5) that similar Institutions should be established in the Punjab, Burma, Eastern Bengal and Assam.

IV. Commercial Education.

Resolved—(a) That in the opinion of this Conference the time has come for the Indian Universities to create Faculties of Commerce and institute degrees in commerce and to affiliate Commercial Colleges that will prepare candidates for University degrees in commerce ;

(b) That there should be established one College of Commerce in each provincial capital and that it should include provision for the training of teachers for Commercial Schools in the Mofussil.

V. Agricultural Banks.

*Resolved—*That the Conference again invites the attention of the Supreme and Provincial Governments to the urgent need of establishing Agricultural Banks for assisting the existing Co-operative Credit Societies, and

for advancing loans direct to agriculturists on easy terms wherever such societies do not exist, with the view of ameliorating the economic condition of the Indian peasantry.

VI. Cotton Excise Duty.

Resolved—That the Conference records again its emphatic protest against the continuance of the excise duty on Indian Mill-made cloth as an unjust and unnecessary import which presses heavily on the industry, and prays that it should be abolished at the earliest opportunity.

VII. Weights and Measures.

Resolved—That this Conference invites the attention of the Government of India to the desirability of introducing uniform weights and measures to facilitate trade among the different towns and provinces of India, to prevent fraudulent practices of traders and remove the present inconveniences arising from a multiplicity of weights and measures and from a want of uniform system and standard.

VIII. Office-bearers and funds for next year.

Resolved—That this Conference re-appoints Rao Bahadur R. N. Mudholkar as General Secretary and authorizes him to appoint an Assistant Secretary with suitable establishment and appeals to the public for a sum of Rs. 5,000 to meet the expenses of the next twelve months.

RAMESHWAR SINGH,
President,
The Fifth Indian Industrial Conference.

Dated 30th December, 1909. } R. N. MUDHOLKAR,
GENERAL SECRETARY,
The Indian Industrial Conference.

PROCEEDINGS

OF THE

Fifth Indian Industrial Conference.

The Fifth Indian Industrial Conference was held in the Bradlaugh Hall at Lahore on Thursday, the 30th December, 1909, under encouraging auspices, a fairly large and distinguished gathering was present. His Honour Sir Louis Dane, the Lieut-Governor of the Punjab, honored the Conference with his presence. His Honor came to the Hall at noon and was received at the gate by the Honorable Maharaja Sir Rameshwar Singh Bahadur, K. C. I. E. of Darbhanga, the President of the Conference, and the Honorable Mr. Harkishen Lal, Chairman of the Reception Committee and was conveyed to the *dais*. Among other distinguished visitors, there were present at the Conference, Colonel Parsons, Divisional Commissioner, Lahore, Mr. F. Noel-Paton, Director-General of Commercial Intelligence in India, Mr. T. A. D. La Touche of the Geological Survey of India, Mr. Hamilton, Registrar of Joint-Stock Companies, Punjab, the Honorable Pandit Madan Mohan Malaviya, President of the Indian National Congress, Sir Pratul Chandra Chatterjee, Mr. Butler, Deputy Commissioner of Lahore, the Honorable Mr. Gokuldas K. Parekh, Rao Bahadur Khandubhai Desai, Dewan Bahadur L. A. Govindaraghava Iyer, etc.

The proceedings of the Conference were opened at 12 noon by Lala Harkishen Lal, Chairman of the Reception Committee, who delivered the following speech, in welcoming the delegates.

Speech of the Chairman of the Reception Committee.

MAHARAJA BAHADUR, YOUR HONOUR, LADIES AND GENTLEMEN:—

Three days ago, I had the honour and pleasure of welcoming, in this place, Delegates to the Indian National Congress, and to-day I have a similar privilege of welcoming Your Highness and Delegates, to a Conference by no means of lesser importance than the Congress itself, though comparatively a newer and a smaller movement. That the Conference has been able to secure the sympathy and support of Your Highness, and of Sir Louis Dane, and that it has followed the opening of an Exhibition at Lahore of the Industries, Arts and Agriculture of India and particularly of the Punjab, Kashmir, Patiala and North-West Frontier Provinces render it, as important as any that has been so far held. Not many days ago, I referred to the history of the origin and development of the idea of holding an Annual Exhibition, and of an Annual Session of the Industrial Conference and I need not take up your time in repeating the same. But I cannot refrain from expressing a wish that the future Exhibitions should be attached directly to the Industrial Conferences rather than to the Congress ; and that the Conferences should be held at Easter rather than at Christmas to enable people to devote more time and more attention to economic subjects than has been hitherto the case.

Professor Marshall in his famous work on Economics observes that : “ man's character is moulded by his everyday work, and by the material resources which he thereby procures, more than by another influence, unless it be that of his religious ideals.” In fact, he goes on to say, “ the two great forming agencies of the World's History have been the religious and the economics.”

“ Here and there the ardour of the military or the artistic spirit has been for a while predominant ; but

religious and economic influences have nowhere been displaced from the front rank, even for a time, and they have nearly always been more important than all others put together. Religious motives are more intense than economic; but their direct action seldom extends over so large a part of life. For the business, by which a person earns his livelihood, generally fills his thoughts during by far the greater part of those hours, in which his mind is at its best; during them his character is being formed by the way in which he uses his faculties in his work, by the thoughts and feelings which it suggests, and by his relations to his associates in work, his employers or his employees.

“ And very often the influence exerted on a person's character by the amount of his income is hardly less, if it is less than that exerted by the way in which it is earned. It makes indeed little real difference to the life of a family whether its yearly income is £1,000 or £5,000. But it makes a very great difference, whether the income is £30 or £150: with £150 the family has, with £30 it has not, the material conditions of a complete life. It is true that in religion, in the family affections and in friendship even the poor may find scope for many of those faculties which are the source of highest happiness. But the conditions which surround extreme poverty, especially in densely crowded places, tend to deaden the higher faculties. Professor Marshall works out his theme to a still greater length, but I need not trouble you here with further quotations. Suffice it to say that in this analysis, Professor Marshall makes no mention of what is called Politics, and places Economics over religion as an agency in moulding man's character and, therefore, his destiny. In India, however, the impression is general, that religion plays a higher and more potent influence than Economics do, and in recent years some of us have come to believe that the political ideals have also a great moulding influence on men's character

and destiny. I do not propose to discuss here the relative importance of religion, politics and economics, but on reflection it is evident that politics are but a passing phase, and once the *magna charta* of people's rights is obtained, and fully followed by the authorities that be, politics cease to be the ideal of man's life, and therefore are not a permanent factor to be reckoned with. Religion and Economics are, however, forces of different potency. Though religion has held a paramount sway over the Indian mind for centuries past, and tried to regulate the economic ideas and relations of the people, but with the advent of the new era, the old order of things has changed, and an adjustment to the new order has become a necessity.

Religious re-adjustment began in India, as far back as the time of Babar, and more recently with the rise of Ram Mohan Roy ; political re-adjustment has been going on for nearly half a century, and a goodly instalment of Reform the people receive in the year of grace 1910. But what about the economic re-adjustment ? Here the opinions widely differ. The advocates of the cause of people strenuously urge and maintain that economically India is declining ; while the apologist for the British administration with equal zeal assert that India is enjoying a prosperity which she had never known before. The late lamented Romesh Chander Dutt, the first President of the Industrial Conference, whose recent loss to the country, we all deplore, asserted that the Truth may lie midway.

Where actually the Truth lies, it is not easy to say, as the problem is not a simple problem. I wish I had by my side the recent publication of the Secretary of State on the subject, but it is perhaps too recent a publication to have reached India. It would, therefore, be unwise to pursue the subject any further in this Address.

However the nature of the problem may be stated. Prosperity-advocates quote huge figures of exports and imports, which seem to be yearly increasing ; they

quote figures of absorption of gold and silver which the country buys annually outside its own boundaries, they quote the rise in wages which has been steadily going up for sometime, they cite large increase in cultivation and the improvements in means of irrigation, and increase in the number of factories yearly springing up all over India.

The adversity-advocates quote on their side the declining in value of the silver, rise in prices, disappearance of hundreds once flourishing industries, the ever-increasing increase of exports over imports, the influx of foreign-manufactured goods, the complete dependence of life on imports, the rise in the standard of living, and the increase in foreign debt of the Government, and smallness of average income compared with other countries of the world.

With these and other factors, to reckon with, which are all of various potency and magnitude, and work out their influence in a variety of ways, it is hard to fix a line of demarcation where prosperity begins and adversity ends. Though unable to answer the general question arising out of consideration of the above-mentioned facts, there is no question as to the extent to which the new economic forces have disturbed the equilibrated society of India.

I shall not here attempt to discuss the relative merits of the statical ideals of East with the dynamical unrest of the West, but that the fact that the society in India has been, economically speaking, disturbed to its extreme depth, cannot be left out of consideration.

The economic relations of the Government and the people have been placed on a new basis, the economic relations of members of families and village communities have altered; the widow, the orphan, the sick, the aged, the indigent, the Brahman, and the Mullah, have now to shift for themselves; places of education, and worship have to be differently maintained; children have to be afforded more expensive bringing up and education; houses

have to be more expensively built and furnished; travelling has to be more luxuriously and largely done; manufactures have to be more expensively and elaborately carried out; marketing of agricultural products has to be differently done, mines have to be differently worked. This argument may be extended *ad infinitum*; whether these changes wean prosperity or adversity, need not be tackled here; but that there is an obvious, patent and profound case for anxiety no one will question.

With these problems before us, and requiring an immediate solution what shall we do?

To deal with the various sections of the problem separately, and exhaustively, is not the object of this Address, nor my limited capacity and opportunities are equal to the task. But a few observations, I may venture to place before you for consideration.

Old economists regarded land, capital, and labour as the factors which produced wealth. Later economists have incidently mentioned skill, scientific knowledge, and training, as equally essential; we have also heard of the "Economic man" as the first person essential in any scheme for production of wealth. I would add a *Sympathetic State* as *sine qua non* in this department of Social Art. Again I must apologise for not being able to work out a complete thesis of the subject. A few words, by way of explanation, may, however, be offered.

In the West where the Phoenix of Economics rises and which is the home and the origin of economic struggle of the world, *the State* as a factor in the production of wealth has not been fully recognised, because it is a factor always present and common. To whichever country of the West we turn our attention, and to whichever assembly of the people we direct our view, I shall not be far wrong in asserting that fully seventy-five per cent of the time and attention of the State and the State assemblies is devoted to economic matters; politics as such, and social re-adjustments,

taking up only the remaining twenty-five per cent. The International competition is anywhere the concern of the States; and I have not discovered another agency equally potent and persistent. Tariff Reform looms large at present, and that alone is a sufficient illustration of the attitude of the State towards the question of International competition. From the contemporary English History alone, one could work out a complete case, but that should be left for a more convenient time. Suffice it to say, that, without the *Sympathetic State* under which a community lives, neither its internal nor its external economic position, is capable of timely readjustment, and where timely readjustment has not been made, the peoples and the countries have sunk. In the West the State is the collected will of its subjects and, therefore, it is the embodiment of Patriotism. I wish the conditions in India would change, that the rulers will carry the collected will of the people with them, and thereby secure the co-operation of the growing Patriotism in the country. The analysis that I have here attempted brings us to the consideration of another factor in Economics, that the Western economists, for reason of its being general and common, leave out of their writings. Patriotism is a force. Its applicability to one's country's religious life may be a sweet dream when applied to politics, it is generally exhausted when *Magna-Chartas* are obtained; when applied to social readjustments it amounts to applying really to Economic readjustments; to Economics as such, it has not been applied in this country to any appreciable extent, but that it is of great potency can be easily established. It should be directed towards Economic problems and without loss of time. Without attempting to pointing out the channels in which it may be directed, I should be pardoned in saying what I conceive to be the meanings of Patriotism. Patriotism means whole-hearted devotion to one's country and its people. Devotion implies sacrifice, which does not mean suicide, or an annihilation; but the spending of the

energies in bettering the condition of the object of devotion. Our energies mean our *time*, our *faculties*, our *efforts* our *money*, and our *influence*. How can they be applied collectively and individually to the service of our country's wealth ? Production is a large theme. I shall not attempt to deal with it here.

With the limited time at my disposal nowadays it has not been possible to work out any complete scheme or pass in review all or any of the momentous economic questions that are agitating the minds of the people. One may, however, hazard a few remarks about the organisation of industries in the country. The country has known, in the past, many a flourishing industry, and has had its own system of distribution of wealth, and the economic protection of the weak. With the factory system of the West and with the organisation of Transport agency in the shape of the Railways and other economic influences all this has changed. It is, therefore, at this stage a problem worth considering whether we should direct our energies towards centralising institutions and work them on factory system or devote our attention towards what is now termed village industries. The relative merits and demerits of the two, have been discussed again and again, and it has been assumed in the discussion that the two systems are antagonistic and could not subsist side by side. This view is partially wrong. Both may exist in a country simultaneously and do immense good in their own peculiar way ; but in a competition between the two, the village industrial system of the past, requires backing up by a system of co-operation in many directions, to hold its own ; and it should be confined to industries peculiarly fitted for small production, while main industries have to be carried out on the present or improved factory system. Mining, for example, could not be carried out as a village industry, nor could a Railway system be easily split up into co-operative village administrations. The Industrial Conference would be doing a deal of good, if it directed

its energies in classifying industries into groups, susceptible of Village system, Factory system and otherwise.

A word may here be said with regard to co-operation. Co-operation means joining of hands in labour, or in capital, or both. This principle has been very extensively applied to finance, and to production, and distribution of wealth on the continent of Europe, and requires careful attention of our people. Again an excellent opportunity is presented for the Industrial Conference, and its members, to familiarise the people with the principles and application of co-operation. Co-operation may in a measure overcome the difficulties experienced by people in acquiring sufficient capital for their undertakings.

When thinking of capital, various problems present themselves to one's mind,

How to organise Capital?

How to preserve Capital when organised ?

For what objects, and under what management should the capital be organised ?

If capital be organised as finance, where, to what extent and under what conditions it should be directed towards production of wealth ?

Should the Foreign Capital be allowed free scope in State and private undertakings ?

How could Foreign Capital be available for private enterprise ?

I am indeed sorry that these matters have not been scientifically dealt with so far, and I humbly direct the attention of the many students of Economics, in the country, to place these subjects in their true light before the people.

Leaving these theoretical but most useful and instructive topics aside, I may be permitted to say a few words about a problem that was before my mind when I visited the Franco-British Exhibition, London, in 1908. Lord Curzon was reported to have said before he left these shores, that India will never be equal to Europe in material prosperity, or industrial eminence, and I kept this

problem before my mind when I had the good luck of being in England.

The Franco-British Exhibition represented in various departments of Industry, the two advanced countries of the world, France and England and their colonies and dependencies. The comparison of the same and similar articles manufactured in France, England, Canada and Algiers distinctly established the fact that climatic conditions or the national genius of the people had very little to do in ninety-five out of hundred cases examined. Their close examination further disclosed the fact that the best valued articles were those in which land, *i.e.*, the raw material played lesser part than the labour expended ; and capital required for plants was also not prohibitive. These are conditions favourable to the circumstances of India. But there were certain facts brought home which do not at present exist in India, but which, if effort be directed in that channel, could be easily established. These facts were : knowledge of proportion and designing, power of organisation, and agencies for marketing. The message that the Franco-British Exhibition sent to us amounts to this: Don't lose heart; look up and adapt yourself to altered conditions. There is nothing that nature has denied us; and nature has not doomed us to live eternally under the law of diversity.

I may now take leave of general observations and say a few words about the economic conditions of my Province. Sir Louis Dane has given us an excellent resume in his admirable speech, at the opening of the Exhibition on 11th December last. I beg to draw the attention of the public-spirited people of the country, to its contents, not because it was delivered by the Governor of our Province, and not because it sums up the work done by the Government agency in various directions, but because it is suggestive of many openings for us, struggling for employment and occupations. It will be futile to attempt to go over the same ground again. His Honour

points out honey-making, poultry, farming, fish and fruit cultivation, silk growing for the millions; coal, Railways, and electricity and oil crushing for the capitalists; leaving out of consideration the agriculture which brings prosperity to millions of his subjects already, and which the Government proposes to further develop.

In this connection, I might venture to suggest both to the people and the Government, the desirability of the people of the Province entering the export and import business; adopted its banking system to help in this direction, and providing transport and storing facilities.

The people of the Punjab with their limited resources of capital and training, in the absence of any active sympathy from the authorities, with their lack of influence in high quarters, and with very limited outlets, I am glad to say, have not been slow in moving with the times. To their credit are Banking and Insurance Companies, Ginning, and Milling Factories and a few Chemical Industries. They all require expansion and systematisation, and I have no doubt the Punjabi will prove equal to the requirements of organised institutions. With better knowledge, and larger opportunities, and with the sympathetic attitude of the Government, the next decade may prove superior to any of its predecessors.

Now, Gentlemen, I take leave of economics, and revert to the pleasant duty of thanking the Maharaja Bahadur on behalf of the Reception Committee and the people of the Punjab, in taking all the trouble that he has done in undertaking a long journey to come to Lahore, at this time of the year, to preside over deliberations. With the co-operation of men like Sir Rameshwar Singh better days are surely in store for us. (Loud cheers.)

Election of the President.

After the address of the Chairman of the Reception Committee, Sir Pratul Chandra Chatterjee proposed that the Maharaja Sir Rameshwar Singh Bahadur of Darbhanga

should preside at the Conference. The proposal was duly seconded by Mr. B. R. Panday, the Local Secretary, and carried with acclamation. The Maharaja Bahadur took the chair amid loud and prolonged cheers and delivered the following address.

The President's Address.

**MR. CHAIRMAN OF THE RECEPTION COMMITTEE,
DELEGATES, LADIES AND GENTLEMEN:—**

I have to thank you for the high honour you have bestowed on me in asking me to preside over this important Industrial Conference, thus putting me in the line of succession to those illustrious men who have occupied this position in recent years, and have delivered addresses full of wisdom and knowledge to the Conference.

Conscious as I am of my deficiencies in many respects to **speak** on industrial subjects, I trust that my strong interest in every thing that will tend to develop the industrial well-being of our country may be, in your eyes, my excuse for offering you to-day some observations and hints which may not be unfruitful in helping the great cause we have all at heart.

Ladies and Gentlemen, Rome was not built in a day, and nation-building, to be of a permanent order, is necessarily a very slow evolutionary process. We are sometimes apt to get impatient and to hurry forward to reach a goal without going through the intermediate disciplinary stages which are necessary. But the more haste the worse speed. We must be content to do the work that lies before us in our life-time ; to carry on the torch in our own day, and pass it with undimmed lustre to our successors in the race.

The work of nation-building requires the co-operation of all sections of the community. And it is gratifying to find that this feeling of good-fellowship and co-operation is beginning to manifest itself largely amongst the Mahomedan and Hindu communities everywhere in

India. And why should it not be so? Why should not all the separate sections come closer together in furthering the common interests of the country? We can be—

“distinct as the billows,
yet one as the sea.”

Differences in religions, creeds and rituals there will always be amongst us, but these need not interfere with entire community of feeling and co-operative unity of spirit in promoting the material, social, intellectual, political and moral progress of India.

Ladies and Gentlemen, to foster this unity of spirit we ought to bend all our endeavours, by precept and example, for, believe me, it is the basilar foundation on which the superstructure of all real progress rests.

Ladies and Gentlemen, we are met to-day to confer together as to the methods by which the old industries of India may be stimulated into more active life, and new ones brought into being. I need not go into the past history of Indian industries in ancient times on the present occasion. as that was fully brought before you by my eminent predecessor in this chair, H. H. the Gaekwar of Baroda. I will confine my remarks mainly to a general survey of our industrial activities and the prospects as they appear to me of future progress.

We must do “first thing first.” And the first and foremost of all Indian industries is Agriculture. This is the question that deserves our first consideration. The overwhelming majority of our people are tillers of the soil, and they pursue their calling by the most primitive methods which have apparently been stereotyped by the practice of long bygone ages. The soil is not made to yield forth the abundance she is capable of doing, and the consequence is that there are still millions of the inhabitants who do not have enough to eat all the year round, and in years of drought and famine we all know the misery that ensues notwithstanding the splendid efforts of the Government and the land-owners to

assuage and stem the tide of starvation and death at such times. Agriculture is receiving the serious attention of our Government. Agricultural Colleges and Government Farms planted here and there have been doing fruitful work so far as they are able ; but there are not enough of them yet to do more than touch the fringe of the subject. My conviction is that scientific agriculture must begin to be taught and learned at all the primary schools in India, every pupil being practically instructed by means of gardens being attached to each school. I observe that this is also the opinion of Mr. F. Smith, the able Deputy Director of Agriculture in Bengal who has just published a little brochure on the subject, which all interested in the teaching of agriculture should procure and read. It was Jonathan Swift who said "that whoever could make two ears of corn, or two blades of grass, to grow upon a spot of ground where only one grew before, would deserve better of mankind, and do more essential service to his country, than the whole race of politicians put together."

The agricultural education of the people must be put in the foreground of the endeavours of the Government and of all our educational authorities. Experiments at the Government farms have shown that with selected seed and proper treatment the acre can be made to yield on an average from fifty to one hundred per cent. more than it does at present. To take an instance the average out-turn of wheat in India is only from nine to ten bushels per acre. In Great Britain it is over thirty. To raise our average even to fifteen bushels is surely not beyond the reach of Science. The same remarks might be made in regard to all our food crops. An attainable fifty per cent. more, when realised, would go far to banish scarcity and famine from the land.

To take an instance of a fibre crop. The average yield of fibre from an acre of jute is, under present primitive cultivation, not more than 1,100 lbs. The

Agricultural farms have demonstrated that with a little more scientific culture, more than double that weight could be gathered from the same area. If this crop were scientifically cultivated it would mean an additional annual wealth to the two Bengals of at least Rs. 24,00,00,000. And so on all along the agricultural line. All our wealth comes from the ground and the more we get out of it in crops and minerals, the more will all other industries increase and flourish.

I have spoken of the increased wealth to be got out of the soil. I would like to touch for a moment on the yet unexploited wealth to be obtained from the sea. There are of course fisheries in our rivers and in parts of our coastal waters, but these have only merely nibbled at the industry by means of small boats, and have left practically untouched the enormous wealth contained around our vast coast line and inland waters. Quite recently attention has been drawn to the fishing industry as a fruitful field for greatly adding to our food supply and of enriching the material wealth of the country. Fishing brings quite a number of related industries in its train. The manufacture of oil which would find a ready sale; the curing trade, the making of barrels and packing cases, &c., &c., besides furnishing employment to thousands as merchants and vendors of fish and its products, and ultimately as a Swadeshi industry the building of steam trawlers with all their equipments, and out fits of tackle and apparatus. The Province of Madras has shown the way how to tackle the Fisheries on the coast and the Bengal Government have followed in a very efficient and practical manner by proving with their experimental steam trawler that fishing in the Bay of Bengal can be made a profitable trade when brains, capital and expert guidance can be put into the industry. The Fisheries of India surely ought to be an industry that ought to receive every encouragement. The value of the fish taken last year along the coasts of Great Britain amounted to Rs. 18,00,00,000. Who can estimate

the wealth that will accrue to India when vastly greater coast lines are exploited in a similar manner ?

If we turn to our Textile industries we see rapid progress being made in recent years. You had the statistics of the progress of the cotton trade placed before you on a former occasion showing its marvellous strides in recent years. The Jute industries in Bengal show a like rapid increase.

In 1880 there were about 4,800 looms. In 1890 these had increased to 7,964. In 1901, the figures were, 15,336. In 1905, these were 21,318, while in the present year the looms number no less than 30,824. There is still plenty of room for expansion of this manufacturing industry, for we have still to export one-half of the jute crop as raw material. The forty jute mills on the banks of the Hooghly have all been erected under European supervision and all are managed by European firms. Would it not now be possible for Swadeshi enterprise to take part in such an industry? I think there is ample room for such. The fibre itself is practically the monopoly of Bengal and good profits are steadily earned by well-managed concerns.

The Coal industry is but yet in its infancy in India. Barely more than one per cent. of the total raisings of Coal in the world fall as yet to our share. But our Coal stores under-ground are of a practically inexhaustible nature and if these undeveloped resources along with the other mineral wealth of the land such as iron, manganese, mineral oil, etc., etc., are to be exploited by the sons of the soil, no time should be lost in encouraging the educated youth of the country to specialise, each in the departments for which they are fitted, for their future work. We have already technical schools and colleges here for the training of young men in a scientific manner for those pursuits where brains and skill are required, but these educational establishments will have to be multiplied manifold if we are to hold our own in the race of industrial competition and I would counsel all

parents and guardians who have the means to give the heartiest encouragement in their own spheres of influence, to that technical education, without which their sons will be of little use in taking a grip of the professions and industries by means of which we hope to work out the commercial and industrial salvation of India.

Chemists and electrical engineers are wanted in India and these are professions eminently suited for educated young men. The time is at hand when every considerable engineering and textile work will have an expert chemist on their staff, and as for Applied Electricity, the vision before us is one of incalculable progress in every sphere of life; in household economy, in municipal life, in intercommunication, in lighting and in motive power. We seem to be as yet on the threshold of our endeavours to harness electricity to the wants of man, and almost every month new discoveries are being made. There is bound to be a wide field in India in the near future for electrical engineers and electrical work of all kinds, and our educational establishments should lay themselves out more and more to equip men for coping with this great enterprise.

The power of the wind and water for driving motors is as yet hardly touched in this country. There are a number of air-motors or wind-mills in India, but they are far from being so common as they might be. In vast tracks of country in the United States of America, the farmers have erected cheap wind-mills of their own construction and these do nearly all the work from pumping the water to winnowing the grain. Once erected they require little or nothing for up-keep and are always ready for their work. For irrigation purposes, these wind-motors, where they could be applied, would be the means of saving to the cultivating classes of an enormous amount of manual labour.

I have touched upon some of the great industries demanding, in most cases, large capital, combined with

expert technical knowledge and expert business experience to conduct them such as are seen in the great. Tata engineering enterprise, which I hope will be the pioneer of many similar successful schemes, but, as you know, there are multitudes of the smaller industries, some of ancient origin, of our land, that are in great need of revival and of the help to put them on a paying platform. While it almost goes without saying that the commoner kinds of textile fabrics will now fall to the share of the power-loom, there are numerous kinds of the more delicate and beautiful fabrics mostly made in households, and on the simple hand-loom, which would find a ready sale if they could now be got in quantity. The silks of Cashmere, where this industry is being revived, are in large demand. Assam produces a strong indigenous tussar fabric which is coming more to the front as an article of export. In the United States, in Argentine, as well as in some of the countries in Europe, there is a great demand for fabrics of the hand-made order, as against those turned out by the power loom, and India is the home of these manufactures. For the beautiful designs of drawn thread work on cotton and linen cloth, the supply is not nearly equal to the demand, and the beauty of these industries is that they can be made by the people in their own homes. Hitherto no systematic efforts have been made in getting the producers of these articles into touch with foreign customers, who would be only too anxious to purchase them if they were afforded the opportunity. And the same observations apply to the indigenous art wares in metal, the wonderful carvings and the miniature paintings on ivory, which would find a greatly increased sale if they were only brought into contact with the customers.

Exhibitions have done much in this country for showing what India can do in the industries to which I have referred ; but I would humbly suggest that much more could be done with the help of our Department of Commerce and Industry. If arrangement could be made

to have small museums of the products of our industries in art wares, fabrics, etc., attached to the British Consulates in foreign countries, with catalogues and prices, I am sure a great impetus would be given to our indigenous productions, which would greatly stimulate them and enlarge them to the increased wealth of the producers. Japan has already opened a small museum of her products in Calcutta and will reap the benefit of such an enlightened enterprise. Germany has for sometime past had floating museums of her products, visiting all the likely ports in the world. These ships show off the samples, give the prices and the names of the manufacturers, and book orders. These floating museums have been a great success in increasing the foreign trade of Germany. When great Britain adopts the same plan, I trust that India will not be unrepresented in the venture.

There are many industries great and small which it will be in the power of India to tackle in a successful manner when she can bring capital and trained expert knowledge to bear upon them. And this will come in course of time. But meantime we must help on the preparatory work by all the means in our power. There are a great many goods which we still import that can in due time be made by ourselves. And why should we export such products as cotton-seed, when we could export the extracted oil, and enrich the land with the refuse ?

The great sugar industry is passing through a crisis in consequence of the importation of a cheaper kind from foreign countries. I am glad to see, however, that a Federation of the sugar growers in India is to be instituted immediately in order that co-operation may be the means of reducing the cost of production and helping the industry on to a paying platform.

Perhaps at this point it may not be out of place to refer to a subject not unrelated to the progressive deve-

lopment of industrial and commercial enterprise in India, I mean—the standardisation of our weights and measures. The evils of having diverse standards throughout the various Provinces and Districts are manifest to all who buy and sell, and who have ever to translate one standard into its equivalent in another. But how to accomplish the work of Universal Standardisation, which would be an immense boon in oiling the wheels of commerce, is not an easy task judging by the slow process, which other countries are making in the same endeavour. Perhaps, if I may make such a suggestion, it might serve a good purpose if this Conference were to appoint a small select committee to consider the whole question of standardisation and to report at the meeting of the conference next year what in their opinion ought to be the best means of gaining the end in view. At present it seems to be almost as difficult to get a people to change their weights and measures into a Universal Standard as it would be to get them to change their language.

Ladies and Gentlemen, co-operation is the word to pass around everywhere. A new spirit has been born in India. Co-operative Credit Societies, in the formation of which Mr. W. R. Gourlay, I. C. S., the Director of Agriculture, Bengal, has taken a leading part, have been a great success in helping the cultivator to get finance at a moderate rate of interest, without having recourse to the extortionate money-lender, and the Societies are fast multiplying themselves everywhere. It is also a gratifying and healthy feature of the new spirit of commercial enterprise in India that the establishment of purely Swadeshi Banks under experienced management and possessing ample capital, is going on in all quarters of India, and there is ample room for more of these institutions for helping on the expansion of industrial enterprise.

I have mentioned the word "Swadeshi." Freed from the somewhat bitter accretions which

recently clung to it, it is a term of fine import. For it simply means our whole-hearted purpose of doing all we can to foster and develop by all the means in our power the resources of our country. We are sometimes misled into false notions of the prosperity of a country by simply looking at the statistics of its international trade in imports and exports. We forget that the internal trade and commerce are about six times as great as the volume of exports and imports, and it is in the strengthening and increasing and multiplying of our internal trade, that enables us to export the surplus we do not require in exchange for articles we do not produce for ourselves.

Ladies and Gentlemen, we are fortunate that India is under the British Government. This has given us an internal peace without which it would have been impossible to develop the industries of the country at all. Under the Government also we have had the privilege of increased communication still increasing, by means of railways, canals, the post and the telegraphs, each great factors in industrial progress. We have no less cause for congratulation, Government has fostered education, and has done much to help the industries, of the land. But the powers of a Government are limited in all these respects. Much as the Government have done for us and much as we are thankful to the Government for all they have done, it is to ourselves, having received the initiative from above, that we must look for working out the industrial-salvation of our land. We have the brains, the capital, and the enterprise required for going along on safe lines. And we have the growing national spirit which will produce brotherly, helpful and sympathetic co-operation amongst all classes of the community. For without these things we labour in vain.

Ladies and Gentlemen, I have steadily kept in view in any remarks I have made that this is a purely

Industrial Conference. But I would not be misunderstood. Much as I desire to see India increase in wealth and material prosperity, I much more desire that she should see and feel that mere material prosperity is not the be-all and the end-all of life. It should be looked upon as a means and not as an end. The great aim should be to grow men and women, strong and useful, whose lives are permeated with the spirit of true religion instilled into them in their earliest days. Men and women, intelligent and mutually helpful one to one another as opportunities occur, and patiently and joyfully fulfilling their allotted parts in life. Under the wise dispensation of Providence the destinies of the people of India have been entrusted to the ever-watchful care of England. I have faith in the beneficence of British Rule in this country and it seems to me that at the present moment, more than at any other period in the history of our land, since the commencement of British rule, united action on the part of the great communities of this country as well of the English people, is urgently called for to stamp out the remnants of anarchy and sedition and strengthen the hands of Government in the administration of the country. If we desire, as I am sure we all do, the uninterrupted progress of our people in the various activities of life, it is only possible on mutual trust and harmonious co-operation.

The object lesson afforded by the Exhibition you are now holding in this city, can itself be cited as an instance of such co-operation between the Government and the various sections of the Indian community. The marked improvement noticeable in every respect over its predecessors that were held in different other centres, would not have been possible of achievement if the Government officials on the one hand and the leaders of the people on the other, had not vied with each other to bring about such brilliant results. His Honor the Lieutenant-Governor deserves the lasting gratitude of the

people of this province for the ready response he gave to the appeal made to him on behalf of the Committee and for his placing all the available resources of his government at their disposal. I am convinced that a precedent has been established which is certain to be followed in the case of the exhibitions of the future in other parts of India.

Ladies and Gentlemen, India is peopled with many races and communities. Their religious and ethnological characteristics, their traditions and commercial predisposition and their adherence to rooted convictions need not cause any anxiety to the advocate of industrial enterprise in our country. Commercial and industrial co-operation is not inconsistent with the preservation of the religious persuasions existing amongst us. The keynote of success in trade and industry is the adjustment of commercial relations of all classes without regard to religion or race. A united effort to secure the greatest possible material prosperity in the land is honorable labour for the Mahomedan and the Hindu alike and for the official and non-official equally. Commercial and industrial co-operation spreads out its protecting and fostering wing of national prosperity without regard to sectarianism. Ladies and Gentlemen, in the attainment of prosperity as indeed in most other activities in our country the crying need of the hour is for the Hindu and for the Mahomedan to unite and band themselves together for the general advancement of India. The vision of United India will ever remain an abstraction if the two greatest communities in the land did not step up to a common platform of cordial co-operation and close comradeship. As an agency of unification territorial patriotism is great and potent. Light this sacred fire in every Indian heart without consideration of race and creed ; and where more fitting to burn the incense of a nation's devotion than the sphere of commerce and industry. We want India to be a country of happy homes and of a loyal and contented people. This

is the end for which we desire the means to be provided by all the prosperous activities of Indian enterprise.

Ladies and Gentlemen, I have now done and you will allow me to thank you very cordially for the considerate and patient attention with which you have listened to my remarks. I trust that this Conference, like its predecessors, will be the means of giving a still further stimulus to the expansion of the Industries of India. (*Loud and prolonged cheers*).

At the conclusion of the Presidential address, His Honour Sir Louis Dane, the Lieut-Governor of the Punjab made a short but none the less, interesting, informing and instructive speech.

SIR LOUIS DANE'S SPEECH :—

Gentlemen, it is not my intention in coming here to-day to address the Conference at all. In the first place I am not an expert in either commerce or industry, at least not in the sense in which those terms are generally understood, but I claim to be a fairly hardworking man in my own way. Besides, it was my good fortune only a few days ago to have had the opportunity of saying all that I had to say * about the Punjab as a field for the development of commerce and industry. Sir Pratul Chunder Chatterjee and his committee were kind enough to ask me to open the exhibition of agricultural and industrial products of the Punjab. I am very much obliged to Lala Harkishen Lal for the very complimentary terms in which he referred to my poor efforts and I am exceedingly glad to find that a great deal of what I ventured to say as an amateur on that occasion has been fully borne out by the remarks that have fallen from the Maharaja Bahadur in his exceedingly able and far-reaching address. (*Cheers*). I think when we find the Punjab and Behar agreeing on a matter of this kind, there is probably a great deal of truth in what I say especially when those words are uttered without any previous consultation. (*Cheers*): All I can say at the present

* Vide the speech of Sir SIR LOUIS DANE when opening the Lahore Industrial Exhibition given as appendix No. I.

moment is that I am so delighted to see so large and so representative a gathering prepared to discuss and thresh out great questions affecting industry and commerce in India. I have already ventured to say that in the Punjab with its enormous areas that have recently been brought under cultivation and with its comparatively scanty population as compared with other Provinces in India, there is already a field awaiting development of the greatest possible potentialities. We produce already an enormous surplus of raw agricultural products, but those agricultural products unfortunately leave the country and it is my earnest desire and I hope it is the desire of all of you that we should do something to enable us to work up those agricultural products in the country itself and so enrich all classes of the community. (*Cheers*).

I did my best as a company promoter in the best sense of the word the other day to draw the attention of gentlemen possessed of capital and brains to the field that lies in the Punjab, and I desire nothing more than that, and I hope that as result of what they may see in the Punjab and in the city of Lahore, which I have no hesitation in saying is one of the most progressive cities in India—and for saying that I have the highest authority of the Viceroy—I hope that when they see what we are capable of doing, they will come to our assistance with their capital and brains and make this Province attain the rank which I may say a large portion of the Punjabees believe to be the rank of the premier Province in India. (*Cheers*).

There are one or two points that have fallen from the two addresses about which I wish to say a few words. The Maharaja Bahadur has referred to the question of the standardisation of weights and measures. You all know, gentlemen, that this is one of the most important problems which lies before the commercial development of this country. But perhaps some of you may have forgotten, ~~as you are not as old as myself, that the Government of~~ India had already taken steps in this direction and a good

many years ago passed an Act for the regularisation of weights and measures. It so happens that a *seer* is almost exactly the same weight as the French *Kilogramme*, that is, thousand grams, which is the basis of the system of weights that prevails over most of the civilised countries of the world, and the Act exists upon the statute book of the Government of India which has to make a *seer* the same as a *Kilogramme* with the view of introducing that system of weights. If the result of the deliberations of the Conference is to appoint a Committee, as the Maharajah suggests, to further consider this subject and bring it prominently to the notice of the public, I am sure that that result will be of the greatest possible benefit. The time is an excellent one to take some measure, because some of you may have heard that the inconvenience of having our maps prepared by the Survey Department of India, of which we are so proud, on a basis different to that of the maps of most of the civilised countries has forced the Survey Department to arrange that for the future all maps of India shall be prepared upon the metric basis so that you see we already have a practical recognition in India of the metric standard as the proper standard of distance, and the Government of India have recognised the extreme desirability of making our *seer* equal to a *Kilogramme* with a view to adopt that standard of weights. I am sorry to say that a few years ago when I had the honour of serving in the State of Jammu in Kashmere, a proposal was then put forward by the Kashmere Durbar to alter the standard of weights in that country in order to adopt the French system, *i.e.*, practically what is known as metric system but the Government of India did not feel equal at that moment to recommend the Durbar to proceed with that course because they did not consider that India generally was prepared for the adoption of such a change. However, the matter has now been brought forward by my friend the Maharaja Bahadur who is much more

competent to speak on that matter than I, and I am sure it will receive your attention.

Only one other point which I wish to touch upon is the remark of the Hon'ble Mr. Harkishen Lal upon the relative advantages of the village system and the factory system of industry. I can only endorse most fully everything that he has said upon that subject as regards this Province. There is ample room in this Province for all possible extensions of the factory system without interfering with the village system in the least. We are very proud here of our village communities and in fact this is the Province in India where village communities still exist perhaps in their strongest form. (*Cheers*). Nobody will be more sorry than myself to see those village communities interfered with in any way and anything we can do to strengthen the village communities will have the approbation of the Government of India. But at the same time, there are hundreds of petty industries which our village communities may go in for by themselves and by an intelligent system of co-operation transport all their products to the market, and village industries may be carried on quite effectively in this Province, and I hope it may always remain so. (*Cheers*). I have only to say that the Government of the Punjab and all its people feel gratitude to those who have come from other Provinces to visit it and I hope they have thoroughly enjoyed their stay here, and as a result of their visit, I hope they will be able to help us with that capital which at present is not generally held in large masses by the people of the Punjab, to improve its industrial and agricultural condition. (*Cheers*).

Three cheers were called for Sir Louis Dane and responded to most heartily.

THE ANNUAL REPORT.

After the conclusion of this speech His Honour took his departure and the proceedings continued. The presen-

tation of the Annual Report * of the Conference for 1909 with its usual appendices and the summaries about the general industrial work and activity in the country was the next item on the agenda paper. In accordance with past precedents this should have been done by the last year's President, Rao Bahadur R. N. Mudholkar, who is also the General Secretary of the Conference. But as he was unable to attend the session of the Conference owing to a domestic affliction and other difficulties it was presented by Mr. C. Y. Chintamani, the late Assistant Secretary. In laying the Report before the Conference and moving its adoption, Mr. Chintamani made some interesting observations to the following effect :—His first duty was, he said, to refer to the death of Mr. Romesh Chunder Dutt, the first President of the Conference. During the time he was executive head of the Conference he took the deepest interest in the movement, and it was to him the Conference was indebted for the arrangement to continue the work of the Conference between one session and another. Mr. Dutt's death was a great loss to the Conference as to many other movements in the country. Since the first Conference was held at Benares four years ago, the movement has spread to the different provinces. Provincial Industrial Conferences were held this year in the Madras Presidency, the United Provinces and Behar. Such Conferences were held in Bengal and the Central Provinces in previous years, but they were not held this year. The only Province in which no Provincial Industrial Conference has yet been held was the Punjab. At least one of these Conferences led directly to the establishment of an industry. He referred to the Prayag Sugar Works, Limited, which owed its existence to the first United Provinces Industrial Conference held at Allahabad two years ago. The principal object of the Conference was the collection and dissemination, of information, and this the Conference eminently succeeded in

* This is included in this volume.

achieving, as could be seen from the Reports published annually by the office of the Conference. The weakest point in the organisation as was remarked by H. H. the Gaekwar and the late Mr. Dutt, was the want of adequate touch between the Central Office and the Provincial Committees, and it was for the supporters of the Conference to devise means of improving matters in that respect.

Coming to the work done by the Government during the year, the speaker referred to the Government of India's Resolution on the purchase of stores, which was a distinct advance on the orders previously in force, and by that Resolution the Government offered a decided encouragement to the Swadeshi movement. The work in connection with the Tata Institute of Science was making satisfactory progress. In Bombay, a normal class to train teachers of handicrafts was attached to the College of Science, Poona. Another notable event in the Bombay Presidency was the Agricultural Conference recently held at Poona. In Madras the Government appointed two Committees to investigate into the possibilities of chemical industries and the prospects of a wood distillation factory at Ootacamund. The Secretary of State sanctioned the appointment of a Superintendent of Industries and Inspector of Technical Schools in Bengal. In Eastern Bengal an Industrial Conference was held at Dacca, in February, to consider the proposals contained in the Report of Mr. J. N. Gupta, who conducted the industrial survey. In the Central Provinces the Victoria Technical Institute was opened at Amraoti. In Burma, a Conference on technical education was held in February, and it was resolved that a Central Technical School for imparting industrial instruction in the vernacular should be opened. In the Punjab, a Government School of Engineering was shortly to be established, and there was the Exhibition. In the United Provinces, the minor recommendations of the Naini-Tal Industrial Conference were being carried out gradually,

and the Thomason College at Roorkee would be expanded, but the proposal to establish a College of Technology at Cawnpore has not been sanctioned by the Secretary of State. The United Provinces Government were organising an Exhibition of Industries and Agriculture for December, 1910, and it would be one of the grandest Exhibitions held in India.

Of the Indian States, the Government of Mysore awarded Technical Scholarships and held an Annual Dusserah Exhibition. The Industrial Survey of Baroda was completed. A Commercial Intelligence Bureau was established in the State, and two Companies to carry on weaving, dyeing, bleaching and calico-printing were started.

The Kashmir Government awarded Technical Scholarships and were carrying out the Jhelum electric power installation, for opening up of the country by the railway system to be worked by electricity. The Cochin Government awarded four Technical Scholarships, and had instituted an Industrial and Economic Survey.

Thirteen Indian students had joined the London School of Economics and Political Science, in pursuance of a scheme propounded by Professor Lees Smith at the last year's Conference in Madras. Of the people's work, the progress of the Bengal Technical Institute to which two new Departments were added this year, deserved mention.

Mr. Balak Ram Pandya, Secretary to the Industrial Conference Committee, seconded the adoption of the Report, which was carried.

THE PRESIDENT THEN SAID :—

" We have received this year a large number of papers contributed by high Government officials as well as by non-official gentlemen who have devoted themselves to the study of the Industrial problem of the country. They have taken the trouble not only to write the papers for

this Conference, but some of them have attended this meeting at great personal inconvenience and expense for reading their own papers. I would, on your behalf, request the gentlemen present to give us a purport of their papers."

Mr. Frederick Noël-Paton, Director-General of Commercial Intelligence Department, Mr. T. H. D. La Touche of the Geological Survey of India and Mr. Hamilton, Registrar of the Joint Stock Companies, Punjab, accordingly read their papers. The other papers were taken as read and submitted to the Conference. The Resolutions which had been drafted for being moved in the Conference were then moved from the Chair and passed unanimously. The Conference dissolved with a vote of thanks to the President, to His Honor the Lieut-Governor of the Punjab, to the General Secretary, to the Delegates and all other gentlemen, who kindly helped the Conference in more ways than one.

THE PAPERS.

COMBINATION.

BY FREDERICK NOËL-PATON, ESQ.,

Director-General of Commercial Intelligence, Calcutta.

I will not waste time on a statement of the considerations that lead me to address you on a matter of principles instead of expounding a point in statistics or retailing a mass of concrete facts which my hearers might not really follow as delivered orally. Among such matters of principle there is none more important to India at the present time than that of combination.

The most familiar form of combination is that of the Joint Stock Company in which a number of persons who possess some money make it over to the company in exchange for a title to a proportional share of the profits.

An essential feature of this system is the limited liability attached to the holding of such shares. It may seem superfluous to allude to so familiar a fact. I do so because, once more, a principle is involved, and one that applies to forms of combination distinct from the Joint Stock Company. The limitation of liability means that if a shareholder chooses to invest Rs. 10,000 only in the company, he shall not be called upon to make any further contribution in the event of its incurring a loss. Such a guarantee is necessary because a shareholder, merely as such, has no part in the actual management of the concern ; and if the holding of shares laid him open to further levies of indefinite amount, naturally he would not take shares—in other words the company would not be able to raise its capital, and the projected industry would not come into existence.

The Joint Stock Company is only one form of combination ; but in almost all forms this principle must be given effect to. The practical management of the concern must be entrusted to a few persons selected because of their practical experience and ability. They must be protected from untimely interference by the body of participants ; but, on the other hand, the participants must, in consideration of their non-interference, be secured against unlimited loss.

To my knowledge many Indian projects and enterprises miscarry through neglect to provide sufficiently for this principle of reciprocal limitation, or through consciousness on the part of persons disposed to participate, that they do not know how to secure effective observance of it.

Its precise bearing can perhaps be shown best by discussion of one or two forms of combination different from the mere Joint Stock Company; and it is well to select examples which I know to be in the minds of some of you at the present time.

A simple example is that of combination among exporters of Indian yarns, designed to secure and maintain

a larger and more constant control of a particular foreign market. We have seen more than once Indian spinners individually make good a position in a foreign market, build up a connection and establish a reputation in the bazaars for their tickets or *chaps*. Again and again we have seen them abandon the market so far conquered and turn their attention exclusively to an opening that had, through temporary causes, arisen in an entirely opposite direction. The new opening may prove to be as shortlived as the first; and before long we see all the shippers of twist hastening back to the market they had forsaken and beginning afresh the task of building up a trade. It is impossible at times to refrain from likening them to so many energetic cockerels, which bustle hither and thither after each fresh handful of hen-corn that is thrown in one direction or another, while the staid old rooster stands his ground, picks up the last grains of one bounty and is on the spot for the arrival of the next. But I admit that, taking one time with another, the cockerels of Bombay seem to do fairly well. Some of these fickle spinners are surprised to find, on their return, that their tickets have already been forgotten or have been displaced by the tickets and products of competitors from other countries, who have marked and reckoned on the volatile methods of Hindustan. Others accept as inevitable the law that no shipper or manufacturer can escape the evil consequences of playing fast and loose with a market. Although they realise that a little more constancy might ultimately have paid them better than a precipitate and intemperate stampede after the momentary profit apparent in a new quarter, they submit to the evil consequences as a matter of course and set themselves with more or less patience or depression to undo them.

But if a similar temptation were to arise again, they would probably fall as before. And why? Because there is no combination. The individual shipper has his own *narghili* ticket with Turkish script for the Levant markets.

He pushes it for all it is worth, and perhaps a little more, when there is a boom in that quarter. In the beginning his profits may be small for his ticket is unknown ; and just when the business is making headway and promising an assured future, a demand springs up in China and every bale he can ship goes eastward with a pagoda ticket on it as salt for the all too nimble tael. The bazaars beyond Beyrout and Smyrna know the narghili ticket no more for a time ; and when it reappears it is a colourable yet unblushing imitation or the original from Bombay, and it covers a packet of yarn from an Italian spinner who has been smart enough to step into the vacant place. For there is no such thing as registration of marks in that region any more than there are effective rules about short-reeling ; and parenthetically I may draw your attention to the recent complaints of the Manchester Chamber that in the absence of such regulations in the consuming market the strictness of the British rules about reeling for export is disadvantageous to British shippers.

Now, how can the individual Indian shipper contrive to hold his place in a market that for the moment is second best ? As a rule he has no actual representative in the markets of China or the Levant. Consequently he must "take a view," as it is called, and sell when he can. He cannot afford to forego altogether the momentary harvest in the far east ; and if he makes only small shipments to the Levant in order to keep his place there, these shipments, while involving a certain sacrifice, may not be sufficient to accomplish their object, and in many of the bazaars the ticket will cease to be known.

The reply is that the Indian spinners must imitate their competitors in the far east. They must combine. I published in November of 1906 particulars regarding the system followed by the Japanese in this matter ; and in February of 1907 I obtained and published the laws and regulations affecting the Japanese guilds that organise such combination. Since that time our competitors have

elaborated and perfected their organisation. But, so far as has been heard, Indian spinners have in the three years that have elapsed taken no steps to bring themselves into line with modern requirements in this respect. And yet the man who can bring about a combination of this kind will have done a great deal more for India than by appearing on a hundred platforms and reading a hundred dull papers such as I have the honor to submit to you. I shall be happy to give detailed information to the administration if it should propose to interest itself in the matter. In the meantime I may briefly indicate the method adopted by our competitors. It is that a group of spinners or shippers who are in a position to turn out a uniform range of yarns combine. They adopt one set of tickets and syndicate their interests in these tickets in such proportions as they think fit. For instance there may be two spinners each holding a quarter share in the syndicate and two other spinners holding shares respectively of one-fifth and of three-tenths. The syndicate may agree from time to time what quantity of yarn is to be shipped to a given market; and each of the participants is under an obligation to contribute his quota at the price agreed upon. That price is, so far as possible, maintained at a constant level, fluctuations in exchange being ignored more or less; for it is found that the losses by exchange at one time are approximately recouped by the gains at another. It is unnecessary to indicate here the measures to be taken to insure uniformity in the shipments by the several participants.

When the market is in a healthy state and the business is profitable, each participant has a right to "put" his full proportion of the shipments. When the business is unprofitable—relatively or absolutely—he is bound to supply his quota; and it is under these conditions that the full value of combination appears. All share in the temporary sacrifice of keeping the syndicated tickets on the market and in the ultimate gain resulting from their unshaken position there. It is easy to see that the comparatively large quan-

tity of yarn marketed in this way under one set of tickets while the market is active, quickly makes the goods familiar to every buyer and user and obtains for them a recognition and popularity much greater than could be secured by the same quantity of yarn under a number of different tickets. It is still more obvious that when the market is in a depressed or neglected state a relatively small quantity of yarn, if it bears a well known mark, is, even when widely distributed, much more effective in keeping its hold on public notice and favour than a larger aggregate quantity when presented under a variety of marks no one of which is universally recognised.

It may be objected by a particularly shrewd merchant that such an arrangement as is proposed would embarrass him in the exercise of his individual judgment as to when to sell. Even as regards a particularly shrewd merchant, I question whether the exercise of individual judgment, which can only act intermittantly, is likely to count for so much in the end as the continuous pressure of such an organisation as is here discussed. And we must further bear in mind that such a syndicate maintaining permanent representatives in the market to be exploited will possess much fuller data for the exercise of its collective judgment than the individual seller advised only by a number of correspondents as individualistic as himself.

We know that in the far east Indian spinners have to face not only the competition of Japan and of China, but have also to meet systematic combination on the lines discussed above. We know also that in the Levant our rivals are perfecting every part of their organization to repel the invasion from India and that they are doing so with some success, though I was delighted to see in the last consular report from Smyrna that in low count yarns India has now practically disposed of her foreign competitors. The representations recently made by the Manchester Chamber of Commerce on the subjects of short-reeling and of registration of trade marks in those regions—

and to these I have already alluded—show that the British spinners do not mean to leave matters as they are. We know in fact that if we confine ourselves to our present happy-go-lucky methods of “every man for himself and exchange take the hindmost,” we shall ultimately be beaten both in China and in the Levant. There are people who say that we shall be beaten in China whether we combine or not. I see no reason for such a belief. There are others who hear in the projects of Mesopotamian irrigation the death knell of India’s export trade to the Levant. But if there were any bridges in Mesopotamia a great deal of water has to flow under them before the projected dams and barriers are ready for it; and if, a couple of generations hence, our successors will be obliged to sell all their product on the internal Indian markets, that is no reason why we should not take the only measures that can avail to secure happy conditions in our own time.

That is an example of combination relating to the marketing of a finished product; but Indian conditions call for combination both in the conduct of manufactures and in the procuring and producing of raw materials.

As one example of combination in the production of a manufactured article, I may instance the cotton seed industry in which, as I know, a good many of you are taking a lively interest. I think it is recognised now that in this country cotton-seed oil will find its best market in the form of what are called edibles—ghi substitutes and oils for cooking. The crude oil comes into competition with many other oils. The butter substitute has to compete only with one—ghi—and that the dearest article in India. Here the characteristic Indian scruples about fatty matter of unknown origin protect us from foreign competition without raising any awkward tariff question. But, in the first place, the stearines that constitute the butter-like extract form only a small percentage of the oil from which they are obtained. In the second place, the processes of refining demand expert management

and a relatively costly plant. It follows from the first premise that a very large volume of crude oil must be treated to obtain such a quantity of butter substitute as could furnish the basis of a considerable trade. If the establishment that conducts the refining processes is also to crush the seed and make the crude oil, then vast quantities of seed must be brought to it. It will first have to pay inward freight on that seed and will thereafter probably have to pay outward freight on the cake. The cake represents the bulk of the material, and would have to be redistributed to centres where there existed a demand for fodder and manure. A third form of waste would attend this procedure, inasmuch as it would afford no employment for the motive power now latent in those ginnery engines which stand unused during a large part of the year. All these difficulties are overcome if the crushing is done at the ginneries and if only the crude oil is sent to the refinery the cake remaining in those places where the crops are to be manured and where large numbers of cattle are maintained both for cultivation and for transport. This is an industry in which *prima facie* it is more important to be near your raw material than to be near the market for your finished product. For the finished product represents a small part of the weight of the material and is of relatively high value, so that the cost of railing it even to a considerable distance is comparatively unimportant.

But we must not in any industry forget the factor of supervision and control ; and where the seat of such control is not up country it may be necessary to depart from lines that might seem ideal in other respects. When a refinery is to be conducted by a firm whose head office is in one of the great seaports it may often be found advisable to instal it in or near that seaport. This may slightly raise the price of the crude oil but that may be made good by economies in other directions irrespective of the fact that a great seaport would probably offer an excellent

market for better substitutes. Moreover as soon as a fair number of simple crushing mills have sprung up it becomes an advantage to the refinery to be in a central position to which supplies of oil can be obtained from many directions. The presence of large numbers of draft cattle remote from natural fodder supplies would seem to promise the ultimate creation in such ports of a superlative market for the country so that it might even pay to bring the seed down to the coast and crush it there. But it will take them to educate the owners of the cattle to adopt cake; so in the meantime it is perhaps best to discuss the simplest and cheapest system as typified by a refinery established in a cotton district and supervised by a firm or individual on the spot.

From the facts already stated it follows that the company that proposes to refine and to make butter substitutes must, in the beginning organise combination and co-operation between itself and the ginneries. It is necessary to select, as the site of such a pioneer refinery, as is in question a district or tract that contains a number of ginneries likely to co-operate by installing crushing machinery, working it in the off season, and marketing their own cake. The next step is to decide on what scale the refinery is at first to operate, and to fix the quantity of crude oil to be treated. The third step is to establish a definite working arrangement for a series of years with such number of the adjoining ginneries as could furnish that quantity of oil without fail. There are certain places in India where it would be convenient to adopt the American practice of pumping the oil through pipes from the crushing mill to the refinery. It is not possible here to do more than indicate one or two of the forms which might be taken by the working arrangement between the refinery and the ginneries or crushing-mills. In any such arrangement it would probably be necessary to lay down the minimum quantity of crude oil which each crusher was to furnish to the refinery and the maximum quantity which

the refinery should be bound to take over from each crusher. The simplest form of combination in such a case as this is that in which the so-called manufacturers agree to put in crushing plant of a certain capacity and further to take up in whole or in part the joint capital for the installation of the refinery. It is however sometimes found more convenient at a later stage that there should be no actual relationship between the manufacturers and the refiners beyond that constituted by the terms on which the crude oil is to be produced and supplied. These terms may be established on a sliding scale, the price of the oil being automatically regulated with regard, in the first place, to the market price of the seed and, in the second place, to the current price of the staple or standard finished product of the refinery. In this way the interests of manufacturer and refiner are fused to a considerable extent. It comes to be to the interest of the manufacturer to give the refiner good value for his money and to the interests of the refiner that the manufacturer should not have to look beyond him for a market. These however are details ; and they might be largely multiplied. The point to be brought into prominence at the present time is that unless we can develop a certain power of combination amongst ourselves, the establishment of a large cotton seed industry on a basis of most economical working remains in the air.

You have probably all noticed that an arrangement analogous to that here proposed has recently been made by a Company which proposes to produce beet sugar in England. The Company has entered into contracts under which a number of neighbouring farmers have bound themselves to cultivate a sufficient quantity of beet for a series of years and although the full details as to regulation of price are not yet known in this country it may be assumed that the terms are some what on the lines indicated as possible in respect of cotton oil in India. Another act of combination which may well afford valuable suggestions

for a compact between seed crushers and the refinery is that which was established between the manufacturers and the producers of beet sugar under the Austrian and German cartels. There is no time to go into the terms here, but those of my hearers who possess a copy of my *Notes on Sugar in India* will find them outlined at page 7 of the second edition.

It will probably suffice if I add one other example. It is one that will appeal to you all. It relates primarily to the production of a true raw material and secondarily to the creation of a great industry—a worthy sugar industry. It is impossible for any one whose life and interests are bound up with those of India to view with perfect satisfaction the enormous supplies of sugar which this country now obtains from abroad at prices considerably below the cost of production in India. In the list of articles of import into India sugar now stands second. In the last ten years the annual imports of foreign sugar have risen from 203,875 tons with value of four crores to 533,164 tons with value of Rs. 10·4 crores : that is to say they have increased by 329,289 tons or 160 per cent. In the first six months of the current year the imports amounted to 264,386 tons. Assuming the shipments of the second six months to be in the same proportion as appeared in other years, the total should amount to 586,809 tons, thus showing a further increase of 10 per cent. This at the rate of $1\frac{1}{4}$ tons to the acre is equivalent to the yield from 496,447 acres. In the ten years the area under cane has been reduced by 570,000 acres—equal, say, to 712,500 tons of sugar—and has contracted from 2,755,000 to 2,185,000 acres. This latter figure, added to the acreage equivalent of imports as stated above, indicates a total possible sugar area of 2,654,447 acres in India if only $1\frac{1}{4}$ tons were produced to the acre; and the sum of imported sugar and the potential cane sucrose in the reporting tracts of India is about 3·26 million tons per annum as compared with 3·65 million tons ten years ago. To that figure is to be added some

562,000 tons of palm sucrose: In other words, the total quantity of sugar in all its forms has declined by some 390,000 tons. This results from the contraction in the cane areas and has taken place in spite of—or as a consequence of—the heavy increase in imports. But great part of the indigenous sucrose will necessarily continue to be consumed in the form of cane, gur or jaggery; and a very conjectural estimate of the portion that might be expected to come within the operations of a large industry production of commercial sugar gives a total of 874,500 tons crystallised sugar with a value of about Rs. 17 crores of rupees. These figures indicate roughly the extent of the demand which an indigenous industry might supply, and it is seen that whereas ten years ago imported sugar represented only 5.9 per cent. of the indigenous production and 5.6 per cent. of the total, it now amounts to 19.5 per cent. of the indigenous production and 16.3 per cent. of the total.

I have pointed out that we have an increase of 329,000 tons in the annual imports side by side with a decline of 712,000 tons in the internal production and a net loss of 390,000 tons in the available supply of sugar. But which is cause and which effect, no one can tell with certainty. If it were possible to say definitely that the importation of cheap sugar was responsible for the contraction it would be difficult to maintain that free importation was good for the country. But we are aware that the high prices of food grains, cotton and other crops must have counted for a good deal in the neglect of cane; and it is possible that the imports have been no more than an effort to make good the resultant shortage. In any case I know of no formula that will enable us to estimate the effect of the imports of sugar.

We must admit from the outset that the imported sugar succeeds by virtue of its cheapness and excellence, and that a cheap supply of a valuable article of food is *per se* a boon to the country. And yet it is impossible to desist

from the effort to find some means by which India may be enabled to produce that food for itself at an equally low cost. Let us not blink the fact that this lowness of cost is the essence of the problem. If Indian sugar is to be much dearer than foreign sugar we may as well leave the thing alone. If it would necessarily and to all time cost India *considerably* more to produce her sugar than to procure it from abroad, then we must as practical men and not visionaries, resign ourselves. For she procures her foreign sugar by growing and exporting more produce of those kinds in which she excels ; and if, for a given expenditure on the cultivation of jute, cotton, wheat and seeds, she procures from abroad more sugar than she could herself turn out for an equal expenditure it is palpable that, for the moment at all events, she makes a saving.

But no one will deny that if she could produce that sugar for a sum not much greater than she now remits for it, she ought to do so. At present she certainly does not. That is practically equivalent to saying that under existing conditions and by existing methods she cannot ; and it is our duty to ascertain the reasons. For myself I am convinced that the principal reason lies in her characteristic disregard of theory—her failure to ascertain and define the principles by which competing countries regulate their action, and to recognise in clear terms the overwhelming contrast that exists between the conditions that have been laboriously brought about in those countries and the conditions which India herself allows to survive year after year in blindness to the lessons plainly set before her.

I will not go at length into an account of the Indian conditions. They are known to you all. I shall content myself with indicating those points in respect of which her practice is at variance with the principles regarded elsewhere as axiomatic and absolute. But in order that you may perceive the force of the contrast I may premise that centralization has been and is increasingly the keynote

of all successful enterprise in the modern cane sugar industry, and that centralization in this connection has a somewhat special meaning. It means not only the replacing of numerous small appliances by relatively few establishments of sufficient size to insure economical working and to support the cost of expert supervision. It means still more the concentration of the cane fields in the immediate vicinity of the factory.

The sucrose in cane that has been cut undergoes rapid chemical change ; and unless the cane is taken to the rolls in a short time a large part of the potential sugar is lost. When I say a large part I mean so large a part as to prevent from the very beginning any hope of profit on a truly competitive basis.

But so far as I have been able to find, there is not in all India one establishment where the principle of centralization is observed or even expressly recognised as the subject of a pious aspiration. And if we have not diagnosed the precise nature of the disabilities from which we suffer, if we have no clear conception of the remedies employed in other countries, and if in short the fundamental principle of the whole issue is disregarded and indeed unrecognised, what wonder that we feel ourselves to be in the dark and that such little improvements as we attempt in cultivation and in manufacture are undertaken grudgingly, half-heartedly and—so far as the prospects of a great commercial enterprise are concerned—quite fruitlessly ? Why should any one go to the expense of importing and acclimatising improved cane seedlings, of intensive cultivation and of heavy manuring if he has not realised that the key of the whole proposition is to get the heaviest possible yield off the lands near the factory in order that the total area may be restricted and the cane may get quickly to the rolls ? Unless he appreciates the extent of the loss that attends delay, he sometimes conceives that he is saving money by careless production of a sparse crop upon a large number of acres instead of

costly production of a heavy crop on a few. In fact unless he grasps the principle of the thing there is no reason why he should not grow degenerate cane, spread his fields over half the district and then invite his local customers to go out and consume the produce on the ground. He may possibly make that pay. But it does not help the country to build up a real sugar industry and to become self-supporting.

Every occasion for impressing this truth upon the public has been taken ; and I have published a succession of Reports from foreign countries which exemplified the conditions essential to profitable working. Comment in the press and in letters received has shown that the truth of the contention has been gradually obtaining acceptance ; but it seemed desirable to quote some entirely independent authority on the subject. The modern literature relating to the cultivation and manufacture of cane sugar was carefully examined for a pronouncement on the point in question ; but, while the procedure recommended pointed in every case to the central factory system as the key of the proposition, the principle was found to be assumed as a matter of course rather than formulated specifically.

In view of the enormous importance of the matter, a letter was addressed to Mr. Prinsen Geerligs who is probably the greatest authority in the world. After statement of the considerations indicated above, the following questions were submitted to him for favour of his opinion:—

(a) Whether the central factory system as above defined is the most important single factor in success?

(b) What is the maximum distance from which cane may be carried, or the maximum delay that may safely be allowed to occur before it reaches the mill ?

(c) Is there any work that describes in detail the method and organization by which the central factory system may be strictly carried out ?

A reply has just been received, and is of the greatest value. We are greatly indebted to the writer for the

trouble he has taken ; and we give his opinion in his own words :—

“ In this present time only large sugar factories have a chance of competing on the world's market. Small factories, scantily equipped, as were found formerly belonging to one proprietor, who led a semi-patriarchal life on his premises, are no longer a possibility and, if still existent, cannot prosper and will have to make place for big concerns, able to work factories grinding 700 or 800 tons of cane a day as a minimum.

“ Only such factories can work economically and make money by doing the work on a large scale, thus dividing the necessary expenses over a great amount of product and minimizing the self cost per ton. At the same time such big factories can afford to pay for good skilled labour and attendance, which is not the case in small mills, where by lack of capable engineers or overseers, work is not conducted on a rational footing.

“ With regard to your questions :—

“(a) Yes, the central factory system, *i.e.* a large factory working of the cane of a vast tract of land, is, as already pointed out, in these times the only possible way of making sugar manufacture pay.

“(b) The maximum distance from which cane may be carried, or the maximum delay that may safely be allowed to occur before cane reaches the mill greatly depends on the climate of the country. In Java, where the climate is very hot and moist, a delay of 24 hours between cutting and grinding is in the hot months already detrimental, and in well conducted mills great care is taken that every day all the cane cut is crushed that same day. In Cuba, on the contrary, I have even witnessed that canes were hauled to the mill from a very long distance, even hundreds of miles off by railway, without a serious decline in the quality. I should say that in India the utmost delay between cutting and crushing should never exceed the time of two times 24 hours. The distance depends of course

entirely on the rapidity of the traffic. Transport by rail can of course carry the canes from a much farther distance than transport by barrows or bullock carts.

“(c) I know of no work dealing in detail with central factory systems.” (McRobert.)

Not content with growing degenerate cane and cultivating it carelessly and in small patches scattered over a wide area, we commonly convert our deteriorated juice into gur, keep it for a time till it has still further deteriorated and then convert it into sugar. There is and will always be a demand for gur as such. There is no doubt still a large market for dear sugar made from gur ; but can any one look at the figures of imports which I have shown and, having considered the quality and the price of those imports, then prophesy anything but a gradual decline in that local business ? What I want to bring out to-day is that unless we can combine to procure the adoption in India of essential principles, there is no use in making sanguine phrases about the situation. Economic laws are as universal, absolute and remorseless as the law of gravitation. Java, Mauritius, Porto Rico, Trinidad, the Phillipines, Formosa the West Indies—all have had to bow to this law of centralization. I invite you—I beg you to study the records of the industry in all these places and to see for yourselves whether what I say is true. Every modern improvement in cultivation and manufacture is adopted in these countries ; but in no case have these alone been found to suffice. In every case the producers were driven to adopt that principle of centralization which we in India disregard and even for the most part ignore. Java and Mauritius have cane at least as good as we can reasonably hope to produce, even when we shall have adopted their methods of cultivation. They strive to preserve every unit of the sucrose. They save every penny in their processes, they ship cheaply, and they sell for a small competitive profit. We, on the other hand, conduct our industry on prehistoric lines, waste our substance

at every step, and then wonder that our markets are invaded. To talk of protecting them under such conditions is mere moonshine. You might as well think of meeting long-range guns with bows and arrows.

I think I hear some of my protectionist friends say "Why? Put on an import duty to countervail the difference in cost of production and the thing is done." Now, no man is a stronger believer in the encouragement of home industries than I am. I believe in it not only as a gospel but as a business proposition, and my friends from Bombay know that I so believed in it and professed it long before any of us had heard the word "Swadeshi." But there is a limit to my enthusiasm and when I am asked to discard the well-tried economic doctrines that are found to apply throughout the world: when it is proposed that I should put in their place a homespun system of economic science in which the sum of two minus quantities is a plus, I can only say that I prefer the imported article. For purposes of argument, it might be admitted that when all the premises for a sound industry are present, there is little economic vice in protecting the seedling from the blasts of competition till it is in a fit state to brave them. But can any honest man say that in the Indian sugar industry to-day more than the very rawest materials of success are present? In other words is any one in a position to assert that if moderate protection were granted for a short time the indigenous industry could without radical change give the Indian consumer sugar as good and as cheap as he now gets from abroad? We certainly are not. The waste is there and must be eliminated. Until the industry is able to show that in respect of cultivation, transport and manufacture it is about to adopt all those methods which give assurance of the cheapest possible production, proposals for effective protection even of a temporary character would, I imagine, be rejected even by a college of protectionists, and would be rejected not on political grounds but because it is

economically unsound to the point of absurdity. It amounts to this that the producer is free to go on wasting what in Scotland we were taught as children to call "God's mercies"—in other words misusing the materials and opportunities. He has provided—and that the unfortunate consumer is to pay for all this waste. That of course is nonsense. Let the industry first set its house in order or bring its construction at least into some sort of conformity with the law of economic gravitation, and it will then be seen whether it cannot stand without props as others have done.

One thing is certain : that without prompt combination between capitalists and landholders the house will not be set in order in time to be of any use. The first thing is to convince the country that the present scattered cultivation of degenerate cane is prohibitive of any serious success. Before the cane could reach the rolls of a properly equipped factory it must have lost more of its virtue than would have furnished our competitors with working expenses, freight, duty, and profit. Many of my audience own prime motors. What would they think of an engineer who proposed to work his boiler by making every mill-hand bring a kettle-ful of hot water from his distant hearth in the morning ? The question seems idle ; but really the propositions compared are to a great extent analogous. There are no degrees in the impossible.

When the country has become satisfied of the absurdity of the present system of scattered cultivation, some means will no doubt be found of securing homogeneous tracts about points suitable for large central factories. Wherever new land is being brought under cultivation by means of irrigation an effort should be made to secure a large block of it for this purpose and the Lieutenant-Governor in his speech at the opening of the Exhibition showed that the Local Government is fully alive to this principle. It is impossible to displace cultivators in possession of old lands ; and

it might not be easy to induce them at once to devote it primarily all to sugar-cane. In other countries where there existed a fuller apprehension of the importance of centralization, means were found of overcoming the obstruction of the ignorant cultivator. But only for a short time was it necessary to use persuasion; for wherever the central factory system was fully put in practice, it became profitable to the manufacturer to pay for his cane such a price as relieved the cultivator from all temptation to revert to other crops. Perhaps in India the factory established on old lands would have to guarantee a minimum price for a time ; but those land-owners who satisfy themselves regarding the importance of centralization, and as to the prospects of success which it offers, will no doubt be able to use some influence with their tenants.

My paper has already run to inordinate length ; so I must content myself with a mere allusion to the other function of combination in this connection—the finding of capital for factories on a suitable scale. In every country the tendency is towards factories on a larger scale ; and if India is to take a hand in the game at all it will have to conform to the rules. But lest any of you in your study of the matter should be scared by the volume of the capital owned by the average company in Java, Mauritius or Formosa, it is well to remind you that the said capital is usually provided not for the factory alone, but for the plantation with its equipment of tramways, etc., designed to secure quick transit.

I hear that an association of sugar producers is being formed in India, and that this association proposes first of all to define the principles to be followed in the creation of a worthy sugar industry. To this end, it will probably be necessary to bring to India an expert capable of saying how far these principles can be realised.

My personal impression is that the principal danger to be run by such an association is that of being beguiled

into compromising upon first principles. Its temptation will almost inevitably be to welcome in its ranks members whose interests are more or less bound up with the old methods or whose minds are incapable of accepting an entirely fresh departure. If such members were admitted it might be very difficult for an association to keep in the forefront of its policy such a flat repudiation of those old methods as is necessary, seeing that the central system is the very antithesis and negation of those methods. For these reasons I trust most earnestly that the association will require a very strict qualification and test of its members. For indeed there is in my opinion no time for compromise or half-measures. If the Indian sugar industry is to be saved the measures will have to be drastic and prompt; and an association often accomplishes much more with a steadily growing constituency holding sound and homogeneous views than with a large and dissident membership incorporating everything that is uninformed and irreconcilable.

But while we are taking stock in this way of the disabilities under which we labour in respect of sugar, it is even more germane to my subject to determine what are the conditions of general application that render the effective combination of capitalists in this country so difficult of attainment. In touching at all upon this subject I feel very much as if I were setting out to instruct you in the idioms of Hindustani. Palpably, you are much more likely to know the causes of this difficulty than I am. But I have in fact very often had to talk over specific industrial projects with groups of Indian gentlemen who were keenly interested and indeed convinced that there was money in the propositions, and you cannot be more sure than I am of the difficulty of getting them to combine effectively. Time after time, the negotiations fall through for reasons that are not apparent and which the gentlemen themselves seem to have difficulty in stating. Though I have often asked my Indian friends for an explanation of

it, I have not once received a reply that really satisfied one's reason. And yet it is of the very first importance to put one's finger with exactness on the seat of this disease before essaying to cure it. So in the hope of eliciting some helpful discussion from persons better versed in the matter than myself, I submit my theory in an interrogative form.

Is it that the average Indian capitalist while he fears, (like capitalists elsewhere,) that he may be cheated by some of his associates, does not know, as western capitalists or their agents commonly do, the means by which he might protect himself? I believe that this is the main cause of the difficulty; and I do so not only because the symptoms commonly point to that conclusion but because on several occasions when I have put the question plump, I have received a laughing but shame-faced admission in the affirmative. And yet there in nothing particular to be ashamed of. It is not customary in any country to put oneself absolutely in the hands of any but the most tried business associates: and in India the prejudice against muzzling the ox that treads out the corn has, I think, entered into the conception of commercial integrity and begotten a certain tolerance of commissions and "makings" that are discountenanced in the western world.

But most of the capitalists whose money is not already fully engaged are ignorant of the methods of what is called industrial control; and they are deterred from embarking in an unfamiliar project by the very reasonable reflection that they would be unable to tell whether the various reports made to them by the managers were correct and whether the methods employed in the conduct of the business were good. For example it would be difficult for a man who had dealt in wheat all his life to be sure that if he erected a flour mill and employed a manager he would be able to check that manager's estimates of cost of production at any given date. My own opinion is that our commercial schools ought to give more

attention to these matters than is now bestowed on them. While on leave last year, I discussed this subject with the heads of some of the great industrial colleges at home. They appreciated the point; and I am glad to see that the President of the Manchester Association of Engineers has recently, in his presidential address, ascribed, as I do, the comparative failure of technical scientific education to the fact that students are not taught how to find the costs of the materials and processes involved in their operations. It is comparatively easy to teach principles of book-keeping which are more or less applicable to all industries, and to show how they may be adapted to particular cases. But cost of production is on a different footing. The form to be used varies with the particular industry to which it relates; and the formulæ given in works on book-keeping are often defective. Recently when I discussed the matter with the very alert head of a commercial school in Southern India, he called for several text-books to satisfy me that this branch of the science was not neglected. He was astonished when I pointed out to him that not one of the forms shown me took into consideration the proceeds of the sale of bye-products. Now, there are few industries in which bye-products do not exist or in which the disposal of the bye-products does not play an important part in the profit-making. And if a capitalist does not know how to ascertain the extent to which their advantageous disposal affects the cost of his staple product, he perhaps does well to keep his money in a bag. I am convinced, that if capitalists could be furnished with approved forms suitable to any particular industry, a great deal of their timidity would disappear and we should see prospering in India several industries for which an opening appears to exist. In most cases a chartered accountant of large experience would be able to give valuable advice in such a matter. But there are many self-styled accountants whose only charter is of the same spontaneous origin as that of the

chartered libertine and who are neither expert nor experienced. For this reason I venture to suggest that the administration of this conference might, with advantage, interest itself in having a set of such forms drawn up by reliable authorities.

I cannot say how far the peculiar monetary complications involved in the system of the Hindu undivided family prevent the effective action of the individual in industrial enterprise; but they can scarcely fail to embarrass both the individual himself and those with whom he might be disposed, if free, to enter into combination. It is difficult enough to procure perfect agreement within a group of individuals untrammelled by outsiders; but when every member of that group has behind him a number of relatives the problem becomes intimidating. Some of these relatives may be actively hostile to the project: others may be merely indifferent and disposed to leave matters as they are; others are no doubt so ignorant that they cannot understand the nature of the investment: yet another group may be definitely suspicious of the instigator's motives or of his associates, while a fifth party possibly give it to be understood that their consent can be had only at a price. And perhaps the most embarrassing of all is the enthusiast who as soon as he is taken into confidence "gives the show away" to his friends in the bazaar. All this must take the successful launching of a joint venture a matter of exceeding difficulty, although the leader of an undivided Hindu family can, to a great extent, impose his will on the others and although I am told that the institution is giving way to modern conditions. But the short and the long of the matter is this. If we are to succeed in founding any of those large industries which we have discussed: if we are even to maintain and improve the position of such as already exist, it is absolutely necessary that methods of combination should be adopted not in a make-shift spirit but in earnest. This is the key of the economic development of India. Until it is mastered there is little

use in pointing out and analysing the openings for such various industries, as might exist if only we were prepared to exploit them. The only effect of doing so is to make the simple enthusiast a prey to the wily promoter. We must teach the enthusiast to take care of himself. It is almost vain to instruct our young men in technical processes if we do not give the capitalist the opportunity of learning the methods of industrial control. It is futile to reproach them for timidity if we do not arm them with the knowledge by which they might protect themselves against dishonesty or incapacity in their subordinates. We must not be content with a mere aspiration towards combination. Generalizations are of no use. I submit with the greatest deference that the proceedings of these conferences are themselves open to criticism on this score. I have read the proceedings of the successive conferences, and I have been struck by their desultory character. I have from time to time urged on eminent members of your body that these meetings would be more fruitful if one or two specific subjects were prescribed for each year and arrangements made for a symposium of opinion from all the several provinces of India. The speakers would then come up with their budget of local experience and in many cases we should probably make a definite step towards action or at all events towards the formulation of a principle and a policy and towards the prescription of lines to be followed at the succeeding meeting.

I cannot imagine any subject more worthy of such systematic discussion than the principles of combination in industrial enterprise, the nature of the obstacles encountered, and the remedies to be adopted. The details of the organization proper to each separate industry should be worked out as a distinct problem and considered link by link. If my paper should set the ball rolling and induce a systematic study of these several matters one by one I shall not have to apologise so profoundly as I am at the moment disposed to do, for having detained you so long.

THE MARINE FISHERIES OF THE MADRAS PRESIDENCY.*

BY SIR FREDERICK NICHOLSON, K.C.I.E.,

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The Marine Fisheries of the Madras Presidency while of considerable present value, have much greater possibilities. The coast line of some 1,700 miles, exclusive of indentations, necessarily provides work for a large number of families, and food for many more, but the whole industry is still in a primitive condition ; boats in general are either the catamaran (logs tied together) or the dug-out canoe; the area of fishing is limited to a distance not generally exceeding 5 or 6 miles from shore and 6 to 8 fathoms in depth ; the nets and lines worked by such boats are necessarily of comparatively small power ; and the duration of each voyage is but a few hours, usually by day but in some localities and seasons at night also. Curing methods are as primitive as the boats, being practically confined to salting and sun drying under conditions which render the product unacceptable to ordinary tastes and probably deleterious to health. Business organization is similarly crude, and the general ignorance of most of the fishing and even of the curing classes, is profound. The industry is, in a way, suited to physical conditions ; where the surf is heavy, harbours few, and the open sandy beach the only landing place as along the East Coast generally, the catamaran is invaluable since it is unsinkable, can readily and safely be taken through the surf, the logs untied and carried up the beach ; each separate log is also thoroughly disinfected by its alternate immersion and insolation. It would be almost impossible in most places habitually to beach large heavy boats capable of fishing in the open sea ; the surf boats used for seining and cargo work are mere inshore vessels of light timbers sewn together, and are not adapted for fishing. On the West Coast where for 8 or 9 months the sea is calm, the dug-out canoe provides a fairly

* The limits of this paper permit merely a sketch of some of the more salient aspects of the marine fisheries ; the subject could not be exhausted in a dozen papers.

useful boat, which, with care, lasts for many years, but is in no sense anything but a fair weather boat.

Again, these boats tackle, and methods have not been ill-suited to past economic conditions ; in the absence of good roads and rapid communications, catches of fish much larger than could supply the wants of the sea borders, were almost useless ; climate forbade deep-sea voyages for loads of fish which would taint before reaching shore and catches which could not attain a market ; ignorance of good curing methods prevented surplus catches from being properly dealt with ; while cheap boats and cheap methods suited the poverty alike of producer and market. It is probable also that with foods such as the millets, of a monotonous and insipid character, the highly flavoured products of the crude curing methods alone known, were positively acceptable or, at least, had grown so, to the poorer classes, just as the ngapi of Burma is a necessary article of diet to supplement the cereal ration, or as tainted fish of the " Madura cure " is demanded by certain sections of the Madras people.

But with modern conditions have come modern ideas and necessities ; public hygiene demands for the individual and for the community alike and in the common interests of both, that food should be of the best and safest quality obtainable, and should at least be above the suspicion of favouring, if not begetting, disease ; increasing wealth among many sections develops a more fastidious taste in food and a craving for new flavours and foods together with the ability to pay for them ; a population rapidly becoming dense demands more food and more nutrient food ; the fields demand more nourishment if they are to respond to the heavier demands for crops ; the industry and its workers need organization and capital to meet growing necessities.

The first public recognition of the necessity for development of the fisheries was in the mission of Dr. Day in 1869-71 who reported both on the marine and inland fisheries of the whole of India. For various reasons this report was not followed by organized, practical action—save in one very important matter—either on the part of Government or of the people ; the time was not ripe for devising for the distant and vague harvest of the sea

what was barely coming into contemplation for the harvest of the soil under foot; for doing for the scattered, slender line of fisherfolk what was not yet being done for the more exigent and ever-present ryot. The one great exception was the grant of duty-free salt for curing fish within fenced enclosures, a reform initially due to the report and to the subsequent papers of Dr. Day, to whom much honour is owing for his advocacy of this industrial concession.

Dr. Day's suggestions were accepted by the Madras Government, and from 1882 a gradually increasing number of yards, or bonded enclosures, were opened, at which salt is issued not only free of duty but often at rates much below the local cost of the salt to Government. In South Canara the charge per Indian maund (82 lb.) is As. 6-8, or 15 shillings per ton, a price which includes the whole cost of transport from the very distant salt pans of Bombay, Madras or Tuticorin; in other districts the inclusive cost is 10 annas or £. 1-2-6 per ton; the practical result is that the total price charged by Government is often less than the mere transport charge, in which case the concession is an actual bounty. Government take no direct part in the curing; the only conditions are that the fish shall be brought into the yard, salted and dried within its limits, and kept there till presumed fit for issue: the proportion of salt issued is governed by rules which have had the sanction of many years. There are 143 such yards scattered along the coast in which something over 50,000 tons of wet dressed fish are annually cured, the bulk of the yards and by far the greater bulk of the fish cured, being on the comparatively short line of the West Coast which is far more prolific than the eastern.

The result of this concession to the industry has not been all that was expected by Dr. Day, for the cure has not developed in quality, or even in quantity, proportionately to the cheapness of salt; the East Coast cure remains precisely what it was in Dr. Day's time and long before him or before a salt duty was charged, *viz.*, an article often *very badly tainted*, the reasons being that the market seems to prefer or at least to be reconciled to a highly flavoured product which the curers can produce in their ancient way

and with the minimum of care and charge, while, as will presently be seen, the mere cheapness of salt cannot counteract the results as to taint of long-standing primitive and defective customs in catching and marketing. The product of the West Coast is, in general, far better, partly because of the ease with which fish is caught close to the coast, partly because of the comparative abundance of fish so that much is taken direct to the curing yards, partly because of the immense export to Ceylon which will not admit a really bad product; hence greater facility and care in the cure. Yet even on this coast a great deal is badly cured, especially that intended for the markets of the interior and particularly of the eastern tracts. It is obvious that to secure a generally good product the consumer must be educated as well as the producer, and the first step is the production, by various reforms, of a better article which will appeal first to the better class of consumer and will gradually become acceptable and available to others.

So matters remained for some years, till, early in 1905, the Government of Madras—*consule* Lord Amphill—took up the question of the marine and inland fisheries; their objects may be briefly summed up in the words "Better food, more food, more and better fertiliser, better organization." As regards marine fisheries, a brief explanation of these general expressions and of the methods now under experiment for the attainment of these objects will be of interest; the matter of inland fisheries must await another paper.

Better food. This desideratum is placed prior even to the second item because, in the case of fish, quality must be sought before mere quantity; we must make the best use of what we now catch before proceeding to catch yet larger masses. Of all general foods, fish is most liable to taint and most poisonous when tainted, and to increase the amount of the catches under present conditions would be increase the amount of dangerous food. While we need not, at present, accept Dr. Hutchinson's proposition that leprosy is generated by a diet of tainted or badly cured fish, it is *a priori* probable, and the probability is supported by convincing evidence, by expert medical opinion, and by the general

practice and experience of other countries, that such food is productive of, or predisposes to, intestinal and other diseases. Tainted fish as produced in this country are not merely penetrated by masses of the putrefactive bacteria and by the very poisonous results of their activity, but are liable, often in a high degree, to contain—largely through the agency of flies—the germs which cause specific diseases such as cholera, typhoid, etc., especially where the fish are stored in the huts of fishing hamlets which have been the scenes of out-breaks of such diseases, or where fish-curing yards adjoin such hamlets; recent cases, known to the writer, are in point. Apart, however, from this latter danger, the consumption of tainted fish is fraught with hazard, even to individuals or races which are accustomed to it, for the toxic products (ptomaines and toxins) of the putrefactive bacteria are not only produced most rapidly and abundantly in fish but appear to be abnormally dangerous, while even the best of cooking will not destroy some of them. Moreover the dangers arise at a very early stage of decomposition as when fish is soft or pasty, and before the sense of smell gives the danger signal, fish is unsafe at a stage when flesh meat seems to be innocuous.

Now the fish supply of the Presidency outside of the comparatively high class markets of Madras City, of the fishing centres themselves, and of a few places scantily served by fish in ice (and only then as regards those who can pay the price) is in a very great degree tainted; little is beyond suspicion, the grand cause being the tropical temperature which is precisely that at which putrefactive bacteria are most active and consequently taint most rapid.

The boats afford insufficient protection to the fish when caught, and the bulk of these are caught in the day time; the customs of the fishermen and the demands of the immediate fresh-fish market *forbid* the gutting and cleaning of the fish at sea so that the most putrescible portions remain for several hours within the fish; there is no such thing in existence as a live car or contrivance for keeping the fish alive up to the shore; the fish are often hawked about on the beach for local sale before being sent out to the outlying villages, where they mostly arrive in a high state of taint if

the distance exceeds 5 miles, or to the curing yards ; the methods, vessels, locale, and entourage at many curing centres are primitive and faulty. Hence abundant cause, wholly remediable, however, by degrees, for tainted fish whether fresh or cured.

There is however another cause, *viz.*, the demands of the market. On the West Coast, as mentioned above, the bulk of the best cured fish is sent to Ceylon where the regulations forbid the entry of bad fish ; hence the production of a salted and dried article which is far less faulty than that supplied to inland markets, and is in many cases quite tolerable, especially where, as at Tellicherry, etc., the fish is caught solely on account of the curers, to whom it is at once taken. But the inland market appears to demand or easily accept fish in high and even putrid condition ; the product known as " Madura cured " is practically putrid, and the bales on the railway stations, the carts on the sea coast roads, eloquently testify to the character of the products. As in other tropical countries it seems that a monotonous diet of millets and common vegetables demands a strongly tasting accompaniment, and this is supplied by stuff which, as frequently seen on the East Coast, is often fit, in European and the better class of Indian opinion, only for the manure pit. Nevertheless the demand continues, and while no one may dispute tastes, yet it is desirable so to educate the market on the one side and to supply tasty but sound products on the other, as to remove hygienically faulty products from the markets ; in municipalities the Sanitary Inspectors are believed to condemn this class of goods. Moreover it is certain that a better quality of product would greatly increase the demand and consequently the catches ; while tainted fish may be approved by certain classes, those more well-to-do and better educated decline such goods, and millions are consequently deprived of a nutritious food which they would readily buy if a thoroughly sound, pleasant article were supplied.

It would seem, in fact, that while better and equally cheap food for the masses is the main final object of work, it may be more easy to move indirectly, *viz.*, by issuing from improved yards goods produced by the ordinary methods,

e.g., salting and sun drying, but improved by scientific and technical knowledge and slightly more costly than at present, as well as goods prepared by new methods. These improved goods at slightly enhanced prices will appeal to numerous classes at present unable to accept existing products, and this demand will, in turn, foster an improved supply, so that better methods and a greater business will insensibly develop, as on the West Coast under the demand from Ceylon, and more capital will flow into the industry, to the benefit alike of producer and consumer. If the present low class goods are produced and sold at 1 to 2 annas per pound, it may be better to produce and sell better but similar goods at 2 to 3 annas to a better class and an almost unlimited market, for the profits will attract both capital and a better class of producer as well as develop a demand for more raw produce and at better prices. Hence the problems both of better and of more food will tend to a ready and profitable solution.

Hence effort is now being directed in the experimental stations started by the Madras Government to various obvious and simple reforms. Firstly, to the introduction of live cars and live chests, or pens, so that fish can be brought alive to shore and kept in good condition till required; this was a universal custom even in temperate climates till the introduction of cheap ice, and still is in many cases. At the experimental stations the method is being tested and, when success follows, will doubtless become popular. Secondly, fish not kept alive *must be cleaned and washed at sea* and properly stowed; this brings them to shore with a much decreased chance of taint even if several hours intervene, while the time now occupied in gutting them on shore will be saved; this is now a successfully accomplished fact. Thirdly, fish intended to be eaten fresh must not only be brought alive, or properly cleaned, to shore but so treated subsequently that freshness will be preserved for a longer time than usual; experiments in this line have already been successful. Fourthly, the fish must be taken *at once* to the curing yard where cleanliness must be, as elsewhere, an *absolute rule*; clean receptacles, clean salt, clean drying grounds and tables (scaffolds or flakes);

amongst other advantages it is found that fish, untainted to start with and cured in absolute cleanliness, require less salt than in ordinary yards. Fifthly, rapidity of operation is in many cases necessary, so that fish brought in the early morning may be salted, dried (and smoked), by the evening; this has frequently been accomplished already and the product will keep perfectly good for some days. Sixthly, the production of really good products of ordinary and popular character even if at slightly enhanced prices, is a primary object, while nevertheless demonstrating principles and processes common to all proper curing which shall be applicable by the poorest curers to the cheapest goods. Seventhly, wholly new methods which will yield an absolutely wholesome yet tasty product, fit for universal consumption, are necessary and available; salted and dried fish can be supplied free from all taint, smoked fish is already in demand and this cure has been undertaken by several private firms and persons; pickled fish is now under trial, while canning for which experimental plant has been obtained, is a necessity and a certainty of the immediate future. These methods and many other possibilities too numerous to mention, will largely cure the evil of tainted fish supplies, and are already in active, if experimental, progress. But only a beginning has been made, and many years of thought experiment, and demonstration are yet necessary before untainted food will be supplied from all our fishing and curing centres.

More food. This is not so simple a development as may be thought. Moreover there are two branches of the subject; the first is the turning into food of much of the present catches which is not so utilised; secondly the catching of more fish. Firstly; along the West Coast and in parts of the East Coast certain fish appear at times in enormous shoals and are caught in such quantity that, with the appliances and methods now in use, they cannot be treated as food but are dried on the sand and become a rude fertiliser, most of which is exported to foreign countries at low prices. A single recent day's work at one fishing centre produced 110 tons of fresh fish, chiefly mackerel; single hauls of a shore seine frequently exceed several tons of

sardine. There is no more wasteful or unprofitable way of treating such fish than drying them for fertiliser on the sand ; as food they would directly maintain their tens of thousands. When these sardine masses are cured as food, the present method is to clean as many as possible, salt, and dry them in the usual way ; these are fairly good, but those which cannot, for lack of time and space, be so dealt with, are strewn on leaf mats in the sun and dried without cleaning or salt, the result of which—*experlo credite*—is food, but food of which most should be condemned. Again, in parts of the Presidency, scaleless fish or animals are not eaten, so that sharks and dog-fish, skates and rays, porpoises, etc., though caught are not properly utilised as they are on the West Coast ; the flesh of these should be so utilised that less particular folk may be nourished.

It is obvious that the introduction of new methods, enterprise, and capital into the industry will utilise these masses of fish as edible food ; the keeping of quantities of fish—sardines, mackerel, etc. are all caught alive—in live chests or pounds till needed, refrigeration, the use of innocuous preservatives, etc. will enable curers gradually and safely to turn larger quantities of fish into good food ; the method of salting down pilchards in masses, after the Cornish fashion, will equally suit sardines speedier processes and larger plant will deal in equal times with larger quantities ; the introduction of canning on a considerable scale and in large cans, as in Japan, will provide most wholesome food for use even by the masses. All these methods except refrigeration are now under actual experiment, and will be available for public demonstration shortly if not already on view. The limits of this paper prevent further elaboration of this point.

Secondly, more fish should be caught ; the present difficulty of dealing with unwieldy occasional catches is greater than that of disposing of larger ordinary catches, if they can be regularly obtained. The questions here are whether fish are of sufficient general abundance to admit of much larger catches, and, if so, the best method of taking them. As mentioned above, the fishing fleets of the Presidency consist, in general, of catamarans (rafts) and dug-out canoes of

similar small open boats ; hence the fishing is, in general, confined to a narrow and shallow inshore belt of perhaps 6 miles wide and up to 8 fathoms in depth according to locality and season. Within this belt there is a great deal of immemorially ancient fishing with numerous boats, canoes, and apparatus from the villages which line the coast, and it is probable that, except for attacks upon shoals, no great development of capturing methods is desirable or permissible inside that area ; the appearance of steamers and other powerful vessels would be prejudicial not only to the vested fishing interests of a large fishing population, but probably to the supply of fish ; restrictive regulations should certainly precede such up-to-date attempts at development. For attacks upon shoals some license is permissible; probably these vast bodies of fish are as inexhaustible as the herring shoals of the British and other coasts, and it is evidentially certain that vast shoals frequently pass untouched, because unperceived, a few miles out at sea ; it is even true that fishermen sometimes deliberately neglect to make possible catches because present appliances and methods do not admit of dealing with them, a strong argument for the rapid development of curing enterprise. But with regard to deep-sea fishing, *i.e.*, beyond the 6 mile limit, there need be no restriction and there should be development, the obvious method being the use of larger boats using more powerful nets and lines, able to keep the sea comfortably for a week together so as to avoid the vast loss of time in daily voyages, and carrying salt, under the existing Madras rules for the carriage of duty-free salt, for curing their fish on board, as on the coasts of the United States, Holland, etc.

Now private enterprise necessarily feels diffident in deep-sea developments; the fisherfolk are poor and ignorant, and there is no class corresponding to the fishery capitalists who finance and organize the vast fishing industries of Great Britain ; it is not certain that deep-sea fishing will pay ; it is not clear whether the fish are there in such abundance and frequency and accessibility that large boats would pay their expenses, nor is there any one who will risk the cost of building large boats on a speculative enterprise. Hence it

has been left for Government to attempt the enterprise, and two boats are now being built—one a motor boat—to test this question. Though large as compared with existing craft, they are really small, *viz.*, 14 and 22 tons, but they will suffice to settle the question and are big enough for all present ordinary purposes in these waters. Moreover, the use by the Cannanore Experimental Station of two Ratnagiri (Bombay) boats, of about 8 tons each, in these Malabar waters, shows that they can catch, somewhat further out to sea than the canoes, large fish (seer, etc.) in quantities and of a character quite impossible to canoes; using large and long drift nets they bring in very paying loads of valuable fish. Later in the season these boats go still further to sea, remaining out for a week, and catch shark, etc. in abundance, salting their catches on board; hitherto they have used duty-paid salt which, being costly, was used in greatly insufficient quantity; they will now use duty-free salt under the Madras rules above mentioned. Boats such as these and work such as they do, appear to show that deep-sea fishing will pay sailing boats,—possibly with auxiliary motor-power—very well, and a season or two should entirely settle this question; if the answer is in the affirmative, a large field for increasing the regular supply of fish will be opened out. It is doubtful, however, if, at present prices, steam can possibly pay; in these Madras waters trawling is out of the question and steam drifting and lining of uncertain success. In any case the natural primary development from the catamaran and canoes is to the small sailing smack, with perhaps auxiliary motor-power and motor carriers to save time when fish must be brought fresh to shore from catamaran to steam trawler would, *in Madras waters*, be a leap economically unnatural and commercially hazardous.

A method of increasing the food supply is by pisciculture, but for the present this, with one exception, can only be carried out in inland (fresh) waters. The exception is that of the culture of shell-fish, such as oysters and mussels, as so widely carried out in western countries and Japan; being non-migratory these animals yield the largest returns to careful culture; where the oyster is laid there he stays and grows. These shell-fish are very abundant and prolific in India, the backwaters teeming with them, and growing them at rates

unexampled outside of the tropics. The edible oyster is found of good quality in most of the backwaters and can be obtained at nominal rates since it is eaten by Indians only to a small extent; the water at the spawning season is full of spat, and the simplest of means will ensure abundant crops; mussels of huge size and clams are also found in great abundance. It has been found by experiment at Ennore that the oyster spawns in the backwater on the stimulus provided by the inrush of fresh water in the rainy season (there the North-East monsoon,) and tile collectors put down in October 1908 in a somewhat unfavorable corner of the lagoon, were found covered with spat in the middle of December of the same year, with the astonishing additional fact that some of the young oysters had attained the diameter of $1\frac{3}{4}$ inches in a maximum period of ten weeks, a rate of growth absolutely phenomenal when compared with that even of France; a second experiment in the current year has confirmed the previous one. Mussels of eight inches in length are also common and the clam is so abundant as to provide a large lime-burning industry with shell.

Though the oyster and mussel are not greatly utilised as food in India there is a wide opening for a preserving industry; shelled and iced they would be in large demand amongst Europeans in India; shelled and dried there is an inexhaustible market in China; properly canned they would be taken in large quantities in western countries and by Europeans in India; reduced to extract—with or without the meat—by proper processes, they form a highly nourishing and digestible food specially recommended for invalids; mussels and clams are, in America, made into extract which is considered superior even to that from oysters.

Before these steps can be taken it is necessary to survey our best beds, to consider the methods and restrictions necessary for promoting their development, and culture, to test the methods by experiment, and then to publish the details; the Ennore experiment is only a first and slight step in this direction. Restrictions are obviously necessary; Great Britain, America, France, Holland have all ascertained this necessity, and in India we have as a first warning the

practical, if temporary, destruction, or at least depletion, of the well known Karachi oyster beds which formerly supplied excellent oysters in ice at cheap rates to up-country consumers, but which have been depleted by wasteful methods and by the total absence of culture; these mistakes must be avoided.

More and better by-products. This paper can only touch and that briefly, on two such products, *viz.*, sardine oil and fertiliser. As mentioned above, sardine reach the West Coast (and northern parts of the East Coast) in shoals vast but of very irregular periodicity, from June to March; during the South-West monsoon they are practically protected by the weather, which is fortunate since they are then spawning, but from October to March they are fat and easily attacked. These fish produce abundance of fish oil, while the "scrap" after the expression of the oil is a first class fish guano and should contain about 8 per cent. of nitrogen, and a nearly similar amount of phosphoric acid. The oil obtained by ancient methods, *viz.*, by the putrefaction of masses of fish in open receptacles, was a product of disgusting character and its production has largely fallen off, owing mainly to the introduction of mineral oil and to its own unpleasantness. At present the masses of fish which, for want of time or means, cannot be turned into food, are, in general, simply dried on the open sand of the beach; the viscid oil takes up an immense amount of sand, and the whole product when dry is then sent to the coffee estates of the interior or Ceylon, etc. as manure. Hence the consumer obtains a product by no means suitable to his real wants; the oil, useful elsewhere, is not only useless as a fertiliser but is objectionable, clogging the soil and delaying decomposition; some of the nitrogen has been lost by partial putrefaction, while the sand is obviously a mere nuisance. Consequently the producer obtains a very low price, since the consumer has to buy and pay carriage on inert or undesirable matter; neither party is pleased. It is absurd that the fisherman should get only from Rs. 18 to 24, averaging about Rs. 20, for a ton of dried sardine. Now while it is obvious that these valuable substances should be so treated as to insure the obtaining of their full value, the attainment of this object is

not easy. There is considerable difficulty in dealing with them on the large scale in *central* factories ; the shoals are most irregular in appearance, often at long intervals, and though they are probably not far off, it is difficult, with present appliances, to find them ; if the factory deals with dried sardine the sand adulterant is a very serious if not fatal stumbling block and the products are, in any case, less satisfactory than if fresh fish are used ; if with fresh sardine, then regular supplies can only be obtained, and not even then with certainty, by the use of power-driven boats scouring the coasts for catches, in which case the cost may outweigh the value of the products. Hence it would seem more economical, industrially, to have a chain of very small factories, as formerly on the American coasts, which, with plant costing at most only a few hundreds of rupees each, will deal with the sardine wherever and whenever it arrives, and can remain idle without serious loss ; moreover by exercising care and direct supervision locally in drying the fish free from sand, a small factory can continue work on dried fish when fresh fish is not available. The plant required is nothing but one or more open boiling pans, one or more wooden presses, a filter, and a supply of tubs ; with this cheap plant *can* be turned out oil and fertiliser of good quality, which could then be sold to brokers who would blend the products and place them with a guarantee of quality or analysis on the markets ; the oil for various purposes such as the batching of jute, the fertiliser to the hungry fields of India. These petty factories can either be started singly as individual ventures, or in groups by the help and under the control of small firms or capitalists who will obtain their profits as the brokers or middlemen. This method was advocated in public papers about $1\frac{1}{2}$ years ago ; up to date one enterprising Indian merchant has adopted it as a personal venture, and has now three screw presses and boilers ; developments, in the way of promoting a number of such petty works, are under discussion by others. A similar plant intended to demonstrate improvements in the saving of labour, rapidity, the quality of the oil and guano, the preservation of the fresh fish from taint pending operations, etc., has been started by the

Government Experimental Station, and good results are expected. There is a wide opening for proper dealing with such fish as, *at present*, cannot be turned into food; the final object however should be to increase the food supply at the expense of the yield in fertiliser, for the direct nourishment of the people by the consumption of the fish itself is a more economical use of fish than its transformation into fertiliser, which, indeed, should mainly reach the soil *indirectly* after doing its work as food.

But there is a wholly untouched, unobjectionable, and permanent supply of fish manure in "fish waste"; the "utilisation of waste" is one of the reforms which India has to learn from Japan; that which at present is a sanitary nuisance, whether night soil or fish waste, may become a vast source of wealth. Fish waste consists of the offal or guts of the masses of fish brought to shore; of quantities of fish too putrid for use as food; of fish-bones, heads, and other residues; all these are now badly wasted, only a small portion of the offal being used as manure. While it is impossible for a large factory to deal with the stuff which is scattered in small quantities along the coast, it is easy for individuals at each locality to collect it and to utilise it by simple methods now under demonstration. To bury a ton or two of tainted sardines in the porous sand of the beach and dig up what remains some months later, is an error in management; to throw the offal into the sea or leave it on the beach, to bury the skeletons of sharks and skates in the sand and never to dig them up at all, is pure waste. In Japan every ounce of offal, residues, bones, etc. is gathered and added to the compost heap, and this valuable stuff is equally needed here. In America it was recently calculated that the refuse, exclusive of the bones otherwise thrown away, amounts to 112,500 tons annually at an average of 25 per cent. on the catches. If this be taken even to include bones, it means that on this Madras West Coast not less than 15,000 tons are annually wasted, irrespective of tainted fish which are common in this climate. This method of utilising waste is being specially dealt with at the Cannanore Experimental Station.

Better Organization. It is obvious that in developing

the fishing industry for the benefit of the consumer, an essential consideration is the producer ; not merely does the development ultimately rest with him but his welfare is, *pro tanto*, as important as that of the consumer. For it is no new industry to be introduced *ab extra*, but the development of an ancient and indigenous one, employing a vast number of people who have immemorial interests and customs, who form no negligible portion of the population, and who ought to develop *pari passu* with the industry, in status, in intelligence, in independence, and in wealth. The matter is one of extreme difficulty, for while more or less loosely bound in ties of caste or religion—for Hindus, Christians, and Mahomedans are all found in very large numbers—they are far less united in corporate life than the inhabitants of an inland village, with their village administration, defined boundaries, rights and privileges, their corporate sentiment and communal and agricultural ties ; while, taking them, *en masse*, especially on the East Coast, they are far more ignorant and poor and in many cases, less diligent and thrifty, than the cultivator of the soil. Hence if it be difficult to introduce new methods in the villages, it is yet more difficult to develop the fisher folk by means which shall make and keep them independent yet co-operative, and to prevent their degeneration into mere labourers still more at the disposal of richer folk than they are now.

But it is impossible to deal with so vast a question, which is largely administrative and not merely industrial, at the end of a paper already too long. The subject is having attention alongside of the technical ones, and, as might be expected, attempts will be made to develop co-operation side by side with a certain amount of Government assistance, whether by loans after the fashion of agricultural loans, by technical and general education, and by such other means as may arise in practice. There is one advantage which we possess over similar efforts in agriculture, *viz.*, that the demonstration of improvement is easier ; just as the ryot was instant in his recognition of the superiority of the iron sugar-mill over the ancient wooden one (which has disappeared within the period of the writer's service) owing to the fact that it yields, in the more rapid and abundant flow of

juice, a tangible and measurable improvement, so the larger boat, the more powerful net, the larger catches, the more valuable and better-keeping product, will probably appeal at once to the fisherman ; there are, in fact, recent examples of his adopting new nets and long lines on this coast, while several have accepted modern improvements in curing. Hence it may be possible for experts to educate the fisherman in new technical methods more easily than the agriculturist. Hence, again, the necessity for taking care that the improvements introduced, whether in catching or in curing, are, as far as possible, so simple, so cheap, so obvious, so suited both to producer and consumer, as to commend themselves at sight to adoption by persons of limited mental and economic capacity ; to neglect the step-by-step method would be an economic and social error, since the aim should be to foster the independent yet co-operative owner of the fishing smack and the petty factory rather than the capitalist-cum-labourer.

In many cases, moreover, capital will find its easiest and safest outlay in the encouragement of small folk in small ways ; where an industry is obliged to operate over a very long line of coast but on a very narrow sea belt, with no special harbours or railway facilities, with a wholly unorganized and very low priced market in the interior, with uncertain and perhaps merely short-season harvests, and in a tropical climate where taint is immediate and ice unattainable or costly, the central capitalist factory positively invites loss if, except perhaps at one or two localities, it invests heavily in plant. The cost of running a steam fleet, the uncertainty of its catches especially when restricted from interference with the habitual inshore fishing grounds of the ordinary folk, the inability to dispose of such catches except at its own factory, and many other reasons, rule out, for the present, anything except localised effort as displayed in better sailing boats plus small motors ; the wholly British idea which has actually been promulgated in this Presidency, of a steam fleet seeking out fish anywhere in the deep-sea and delivering catches at any port where it might find itself, is ludicrous in the absence of an organized market, trade, and communications. Hence the fostering of local effort and small plant, the supervision of their methods, and the

purchase of their goods, is a more hopeful and possible plan. Similarly in the fish-oil and fertiliser trade, the difficulties in dealing with the fish at a central factory are immense, and, as already argued above, the more advisable plan is one which is consistent with the development of the small folk, *viz.*, the fostering of a chain of petty works by small folk.

To sum up ; we have in this Madras Presidency an ancient industry employing a large population but primitive in its methods from catch to sale ; knowledge and capital, energy and organization, introduced as much as possible by private enterprise, are necessary to improve the old and develop new methods in such wise as to ensure that the present catches shall all be turned into wholesome food ; that these catches shall be gradually augmented, as the fisher folk show capacity to deal with them, so as to assist in feeding a growing population ; that fish which for any good reason cannot be turned into direct food shall, after the expression of their oil, be turned into high class fertiliser for the benefit of *Indian* soil ; that fish waste shall be utilised to the utmost possible extent ; and that these developments shall be carried out as far as possible through and for the benefit of the existing fisher folk and curers, and by means, on the Government side, of a carefully devised general and technical education—and other assistance—in which demonstration through experimental stations, fixed and peripatetic, shall play a chief part. Such are the main items of the direct programme for the Madras Presidency. Be it remembered that if we take the present annual catches in this Presidency roughly as 150,000 tons of edible fish, this is but one-seventh of the British catches for a similar population ; that the addition of only 100,000 tons would mean additional edible rations of something like 180 million pounds, or nearly 4·5 lb. per head for every man, woman, and child in the Presidency, an appreciable addition to the food of the meat-eating population, while there would also be 20,000 tons of offal, etc. for conversion into manure ; the whole of this mass of food and fertiliser would be pure gain to the country and especially to the working classes, while various by-industries, which there has been no space to discuss, would accompany the development ; such industries are those

which relate to boat building, machinery, the pressing and refining of edible vegetable oils, the production of vinegar, pottery, refrigeration, co-opering, pearl button making, tin plate working, etc., to say nothing of increased traffic and business dealings. Briefly, the goal aimed at is the development of a vast existing industry with its concomitant by-industries in such way as to stimulate and develop, enrich and wholesomely feed, the greatest possible number of people in the desirable process of adding the harvest of the sea to the harvest of the soil.

MINING IN INDIA, PAST AND FUTURE.

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It would be impossible to give, in the course of a brief paper such as this, a complete account of the history of the past development of mining in India, or a forecast of its probable development in the future ; and though the title of my subject may lead you to suppose that I am ambitious enough to make the attempt, I can assure you that I have no such intention. I merely wish to draw attention to some of the more general aspects of the question, and to deduce from certain examples drawn from the past a few conclusions regarding the point of view from which the mining industry is looked upon by the native community ; conclusions which may help us to realise what must be done in the future if the people of this country are to take their proper share in the benefits resulting from the development of that industry. For I have the audacity to think that, unless a change of some kind does take place in this respect, you will never be able to establish mining, at any rate, in India as a true Swadeshi enterprise, carried on without the aid of foreign energy and capital.

Mining in India is no new thing. In all parts of the country, wherever useful and valuable ores occur, traces of former activity, both in extracting the ores from the rocks and in smelting and fashioning the metals derived from them, are to be met with. A few instances will suffice to show how

widespread was this activity in ancient times. The existence of old workings in the auriferous tracts of the Indian peninsula is a matter of common knowledge, and numerous references to them are to be found in the publications of the Geological Survey. Dr. Malcolm Maclaren describes the gold bearing reefs of the Dharwar series as honey-combed in places by old workings (Records, Geol. Surv., Ind., Vol. XXXIV, p. 120), dating back at least as far as the thirteenth century A. D., the shafts reaching a depth of 300 feet from the surface, and in one instance at least, at the Hatti mine in the Nizam's dominions, as much as 620 feet. Relics of the mills used for the crushing of the ores extracted from the shafts are still in existence, consisting of large stone crushers rocked to and fro in depressions worn in the hard surface of the bed rock adjacent to the reefs, mortars and pestles grouped together in hundreds where water was available for washing out the gold, and so on. Even the vaguest tradition of these workings had died out when the mines were reopened under modern conditions. In Chota Nagpur similar traces of ancient gold mines have been found (Records, G. S. I., Vol. XXXI, p. 67), though not on so large a scale, and in addition old copper excavations have been traced along what is known as the Copper Belt of Singhbhum for a distance of at least 80 miles, from Duarparam on the Bamini River in the west to Bhairagora on the borders of Mourbhanj (Records, G. S. I. Vol. XXXVIII, p. 35). The iron smelting industry of the Central Provinces and of Birbhum in Bengal has been carried on for ages, and still survives in the face of imported iron, mainly because the soft native charcoal-made iron is of a purer quality than that imported, and is therefore more malleable and more easily managed by the native blacksmiths though the methods employed in its productions are of the rudest description. I need only mention the old copper mines of Sikkim, the copper and silver-lead mines of Kumaon and Kulu, and the numerous traces of old workings that are to be found in Kashmir, in Rajputana, &c., to show how widely the industry was practised in former times. It is hardly possible in fact to travel through any of the hilly tracts of the country without coming across traces of this former activity, but

with hardly an exception, and those such as involve metallurgical operations of the most simple character, as, for instance, iron smelting in the Central Provinces and the washing of gold dust from the river alluvium, all these enterprises have been abandoned and in many cases hardly survive in tradition.

Of metallurgical processes also, although of as rude a type as their methods of extracting and treating the ores, the ancients were by no means without knowledge. The most conspicuous instance of such knowledge is perhaps the manufacture of the famous *woolz* or steel of Southern India. For centuries this material was in demand over the whole of the civilised world, and as Mr. Ball remarks in his *Manual of the Economic Geology of India* (p. 340), "The famous Damascus blades had long attained a reputation for flexibility, strength and beauty before it was known that the material from which they were made was produced in an obscure Indian village, and that traders from Persia found that it paid them to travel to this place, which was difficult of access, in order to obtain the raw material."..... "There are reasons for believing that *woolz* was exported to the west in very early times-possibly 2,000 years ago". Not only was steel thus produced in Southern India for many ages, but Sir Thomas Holland has shown (*Records, G. S. I., Vol. XXV, p. 147*) that two distinct processes of manufacture had been devised by the natives, both of them afterwards imitated and improved upon by steel makers in Europe. One of these was the carburisation of wrought iron in crucibles, a principle not applied in England till the year 1800, when it led to the great development of steel making for the manufacture of the celebrated Sheffield cutlery; but the other is almost more interesting, for in the Salem District Sir Thomas Holland found steel being made by the *decarburisation* of cast iron, thus anticipating by ages the latest developments of steel-making processes, the Bessemer and open-hearth methods.

As another instance of the anticipation of modern methods by natives of this country may be cited the manufacture of iron in the Khasi Hills of Assam, which I have myself seen in operation. The ore found there does not

occur in the form of conspicuous beds or lodes, the detection of which by an uncivilised people would arouse no astonishment, but as almost microscopic particles disseminated through a granite, from which the Khasis obtain the ore by a rude process of hydraulic mining. In the west it is only within recent years that means have been devised for obtaining such fine particles of ore, which is of great purity and therefore of high value, from this class of rocks. Yet here we have the Khasis, an aboriginal tribe, using a practical method of extracting such ore for ages, and turning out a product of such excellent quality that at one time, it was proposed to start smelting works on a large scale in that country.

More instances might no doubt be cited in order to strengthen the case for the ancient miners and metallurgists of this country, the smelting of copper and lead ores, the extraction of silver from the latter, the preparation of alum from pyritous shales, even now a more or less flourishing industry in the Punjab Salt Range, and so on, but it is time that I proceeded to explain what are the conclusions I propose to draw from these well-known facts. How can we account for the arrested development of the industry, not only in modern but also in ancient times ; and is there any hope for its resuscitation on Swadeshi lines in the future ?

The usual explanation of the decline of the native mining and metallurgical industry is that it has been overwhelmed by the competition of imported metals from Europe and America, where a single blast furnace will turn out hundreds of tons of iron while the native furnace is only producing a few seers; and there is no doubt but that this is the main cause. Mr. Ball adds the increasing difficulty of procuring the charcoal necessary for the operation of smelting by native methods, as the forests in the neighbourhood of the furnaces were used up. But this latter difficulty has also led to the extinction of the old 'bloomery' furnaces in Europe ; and with a start of several centuries in the elementary knowledge of the art, with abundance of the raw material at hand, and an overwhelming superiority in population, it cannot be said that India was ill equipped by Nature for the struggle, when it came. It is not to some mysterious defect in the

physical conditions of the country that we must look for the causes of her defeat, but to the apathy of her people. Not, however, I would ask you to observe, of those who were actually engaged in these industries, for the accounts we have by eye-witnesses of their labours show that they worked hard enough, and for a miserable pittance too, poor wretches; but the apathy of their masters, whose only dealings with them were devoted to the squeezing out of the last pice that could be paid in royalties, while leaving them barely enough to keep body and soul together. What progress might not have been made if the discoverer of the process of making *wootz* from iron, or his descendants after him, had been encouraged to pursue his researches, for the man must have been a genius in his way! No one will deny that India has produced in the past, and is still able to produce, men whose intellects are as acute as any that are to be found in the western world. Yet there is not an old mining field in the country where it is not absolutely clear that the miners were stopped, not by failure of the ore, but by inability to deal with the influx of water for want of such a simple piece of apparatus as the common pump. The iron furnaces of Birbhum and the Central Provinces were for years in a moribund condition for want of cheap fuel, though the vast coal-fields of Bengal were lying close by, waiting to be used. Yet it is almost inconceivable that, among so many generations of workers, one man here and there did not arise with glimmering ideas of improvement, which, if fostered, might have led to great results. It is a striking fact that, although the rulers and great men of India have, almost without exception, been liberal patrons of art, and that in metal work especially nowhere else has that art reached so high a standard, yet not one of them seems to have given a thought to the men who won from the earth the material on which that art was expended. No doubt the explanation is that the Aryans were a pastoral and agricultural people, horrified at the idea of descending into the bowels of the earth, and that their genius was not exerted in this direction. The miners usually belonged to the aboriginal tribes, or to the very lowest castes, despised by all, and it is not at all unlikely that, even

if one of a superior class had turned his attention to the invention of improved methods and processes, he would have shared in the reproach which those whom he was trying to serve laboured under.

It is not surprising then that for centuries no progress was made, and that the people of this country were unprepared for the struggle with foreign competition; and, moreover had to be shown by outsiders how to make use of their most valuable mineral assets, the enormous deposits of coal, manganese, and the like, the value of which in the aggregate far surpasses that of any of the minerals, even gold and diamonds, that were ever won by the native miners.

Seeing then that it has been left for an alien race to introduce new methods and stimulate progress that might have been to some extent indigenous, if personal aggrandisement at the expense of others, or purely metaphysical and religious disputations had not absorbed the energies of those endowed with more than average brains, the question arises whether it is too late for the people of this country to take their fair share in the development of its mineral resources, a share to which they are indubitably entitled, since the minerals are one of the assets that have been conferred on them by nature. Are you content merely to receive such a share of the profits as is derived from investments in mining and manufacturing concerns, a poor way of making money at best, looking on while your country is being depleted of the raw material with which Nature has so bountifully supplied you, and compelled to pay highly for the metals which might be very largely extracted from your own mines, and for the articles manufactured from them? A rough estimate shows that, even if all the dividends earned by mining companies remained in the country, which is by no means the case, and even if the paid up capital invested in such enterprises produced 20 per cent., a very liberal estimate, you would receive less than one and a half millions sterling in dividends, while about twenty three millions have to be paid for imported metals and machinery. I am convinced that at least a portion of this drain on the finances of India might have been saved, if more attention had been given in the past to the encouragement and development of the

indigenous arts of mining and metallurgy; for it is quite possible that, with less wasteful methods of smelting and the use of simple machinery, and above all with the assistance of intellects of a higher order than the uneducated classes, to whom the industry was left, could be expected to possess, many of the low grade ores of copper and other minerals, which are now found to be worthless for exploitation on western lines, might have continued to be productive if worked by improved native methods.

Is it now too late for a revival of the native industry to be effected? Such a revival would entail an entire reversal of the aspect with which manual labour, except to a small extent agricultural labour, is regarded by the educated classes, the aristocracy of this country. And yet it is not impossible that such a revolution in ideas, a much more worthy object, though even more difficult of attainment, than a political revolution, might be brought about. Perhaps in no period of English history was the division between the aristocracy and the workers so clearly drawn as it was in the eighteenth century, not much more than a hundred years ago. With very few exceptions, no 'gentleman' would demean himself by soiling his hands with manual labour; but although it took many years to break down the prejudice, and even now it is not entirely extinct, there is no doubt but that, for all practical purposes, it has disappeared. Many persons in the most elevated ranks of society are the descendants of men who, in their youth, worked in mines or factories with their own hands, and now no scion of even the proudest family deems it a dishonour, if his inclinations lead him in that direction, to learn mining or metallurgy, not from books alone, but by actual manual labour side by side with men of lower culture and station in life. I recall a visit I paid some years ago to one of our ship-building magnates in the north of Ireland, and how, soon after my arrival at his house, as I was admiring the evidences of great wealth and culture that surrounded me, the door of my room opened, and what I can only describe as a 'grimy apparition' appeared, a figure blackened with oil and coal dust, bearing every mark of strenuous labour. This, if you please, was the son of the house, employed, not in spending his father's

wealth, or even in superintending his workmen, but as one of the meanest of them at the most insignificant tasks, learning by the sweat of his brow to file a piece of brass to a true surface. My own brother, an Engineer in this country, had to serve his apprenticeship in the same manner ; and as it was necessary that he should understand the working of a railway locomotive, he spent several months, not in the proud position of the engine driver, but in shovelling coal into the furnace and in oiling the machinery, watching the driver at his work the while, before he was allowed to take charge. You will hardly find a house in England in which there is not a workshop of some kind, often including a turning lathe, and none where there are not at least a few carpenter's tools, with which the boys of the family may learn to use their hands, if their inclinations lead them that way. In how many households in India, of the better class, will you find a lad able even to drive a nail efficiently ?

The first advance that must be made is to encourage a belief in the dignity of manual labour; to realise that it is not the dust and sweat of industrial pursuits, (which can be washed off by the application of a little soap and water) that defile a man; but that not all the holy water of Ganges can eradicate the stains too often produced on the mind by the influences to which youths with busy brains but idle hands are subjected. Moreover the change, if it is to be made must come from within; not by book learning only, though I would be the last to depreciate the value of such learning, but by actual practice; for Nature will never yield her secrets to those who merely study that which has been done or thought by others; and for this reason the foundation and fostering by Government of Universities and Schools, however indispensable they may be, can never by themselves supply the whole of your needs. But by encouraging the smallest spark of inventive and constructive genius that may, from time to time, discover itself in the younger men of the coming generation, especially in those of the better and well educated classes; and above all, by using all your influence to discourage the idea that there is anything derogatory to personal dignity in engaging in manual labour. There are many mines and mills in India worked and managed entirely

by natives, and there is nothing but the ingrained prejudice of years to restrain the owners and managers of these concerns from encouraging their sons to learn by actual experience the rudiments of the work, and to fit themselves by that experience to improve upon the crude methods of the older men. It is only in some such way as this, I am convinced, that it will be possible to resuscitate the ancient native industry; and I have a strong suspicion that if the old methods could be even slightly improved, so as to render them more economical in the working, the simplicity of the apparatus required, and the abundance of labour available would make it possible to set up such a number of separate works, though no doubt the outturn of each would be small, that in the aggregate the produce would have an appreciable effect upon the supply of metals, now almost entirely derived, at great cost, from outside the country. I do not think that it is as yet too late; even where the indigenous industry has completely died out, we have accounts by scientific eye-witnesses of the processes employed. It is on record that in some cases improvements tending towards economy were suggested to the workers by these eye-witnesses, but were not accepted, either because of the ingrained prejudice against innovation of any kind so characteristic of such people, or because they knew, from bitter experience, that any increase in outturn would only lead to more extortionate demands on the part of their superiors. Now times have changed; the old workers, with their prejudices, have to a great extent disappeared; and in these days it is a recognised principle that every man is at least entitled to a fair share of the proceeds of his industry. To effect such a revolution will no doubt entail much strenuous effort and some reversal of cherished ideals, but I cannot believe that it is beyond the wit and energy of the India of the present day to make the attempt to carry it out.

TEACHING IN INDIAN ART SCHOOLS.

BY W. S. HADAWAY, ESQ., SUPERINTENDENT, SCHOOL
OF ARTS, MADRAS.

India is fortunate in some respects in regard to its Arts Schools. There are, to begin with, not too many of them, they can command the services of the best native talent and they are supported by Government. One other advantage is that a system of teaching practically impossible elsewhere can be carried on here, in, I believe, a successful manner.

For purposes of comparison, the workings of Art Schools in other countries may be briefly explained, and their faults pointed out. In western countries there are three types of schools. The painting school, in which painting and drawing (and perhaps modelling), are taught with the view to producing picture painters or sculptors ; the " Arts and Crafts " Schools, in which every variety of artistic work, such as wood carving, ornamental metal work, embroidery, enamelling, illuminating, designing and many other arts are taught ; and the evening schools, in which both arts and crafts and drawing and painting are taught.

The first of these three, the drawing and painting schools are conducted in such a way that whatever the student learns is almost always from his own observation and comparison of his own work with that of other students more or less advanced.

Of " teaching," as it is generally understood, that is, the pointing out of faults and showing the way to avoid them in future work, there is hardly any ; the teachers, who are experienced artists, visit the school-rooms perhaps twice a week for an hour or two, and criticise the student's work. Only those who show promise or extraordinary talent come in for a decent share of the teacher's attention, and the struggler, or the one who by nature develops slowly, generally suffers much for want of

encouragement. In schools of this sort, the students are supposed to work for seven or eight hours a day for a period of from four to seven years.

There is generally no instruction whatever in the actual painting or composing of pictures, but the whole work of the school is concentrated on *learning* to draw and paint. The beginner works from the "antique," that is, from plaster casts of Greek or Roman statues, and then from live models, first in drawing only and later in painting.

Any "art" there may be in the pupil, is more often than not stifled, except in exceptional cases, and these schools have the desired effect of making only the fittest survive.

During holidays, the students generally work from nature out of doors and while this is encouraged by holiday work exhibitions at the beginning of the new term, it does not form any part of the school work.

Many students who go into this sort of school get to be very expert at making "life drawings and paintings," and a fair percentage turn out, generally for pecuniary reasons, to be illustrators for the great weekly papers, or magazines or for books.

Of those, who eventually are able to earn a decent living from their work as picture painters only, there are extremely few. The prime drawback of schools of this sort, has always seemed to me to be the lack of "teaching" and not enough is done, as a rule, in inculcating into the minds of the students all the various things which go to the making of works of art. I know that in expressing myself so, I am at odds with many artists who hold the opposite opinion that the school should be the place where method and technique only are taught.

The second type of school, the arts and crafts school, is, in western countries doing a truly useful work. Here the classes are in charge of experts in various lines, artistic book-binders, jewellers, carvers, silversmiths or

followers of other crafts, with sufficient assistants to really teach, mostly by example and demonstration, their own craft to limited numbers of pupils.

Many students, both men and women, who have artistic tastes and inclinations, but not enough talent to become skilful as painters or sculptors, have, by going through these schools, acquired the ability to make beautiful objects in a beautiful way and have gained thus for themselves an excellent and congenial manner of making a living.

One thing nearly always insisted upon in these schools, is that "design" apart by itself, has no meaning—to make a design or pattern for any object, without a proper understanding of how the work is to be carried out, is futile. The cabinet maker or carver should be able to provide his own patterns, just as much as the illuminator who does the actual work himself. The teaching and suggestion of the tool is *as* important if not more important than the actual use of the tool itself. Thus has all really great design grown and flourished.

To take the third type of school, which is a mixture of the first two, this also, supplies a long felt want. It is not conducted with the idea of supplanting or taking the place of apprenticeship, but to assist the apprentice or young journey-man in his artistic calling, by instilling into him an artistic or technical knowledge which it is impossible for him to get in the hurry and worry of ordinary workshop practice.

The division of labour, too, has made it so, that a man skilful at one operation is, in the ordinary commercial workshop kept, perhaps, his whole life long doing but one sort of thing. The evening schools counteract this tendency to a large extent, and by being conducted after workshop hours, it is possible for a keen student to get on and progress with his art.

In looking over these three sorts of schools, it will be seen that there is a reason for existence for each, and that

each has been called into existence because of a real and genuine need. It may be pointed out that in each case, when a student goes in either for drawing and painting only or for an artistic craft, that it is with an inclination for the sort of work he undertakes, and a keenness which makes him give up, willingly, the greater part of his time to his work.

One other point which is of great moment, in nearly all western artistic work, the initiative for creating new work comes from the student himself. He generally finds, if at all thoroughly interested, that each day is far too short, there is never enough time to do the work he would do if the days were longer or his power of producing work greater.

So much for Western methods and schools.

The needs of India varies, however, it is not the same as the West, and it differs much in different parts.

A method of conducting an Art School in Bombay or Lahore or Calcutta may be quite the best possible in those centres, but quite unsuitable to Madras.

I cannot speak with authority on the needs of any of the other centres, so my remarks must be taken as applicable only to my own part of the country, that is, Madras.

Some years ago, in London there was an "Art Teacher's Conference." Many well known teachers read papers on various subjects and among them was one by a well known modern jeweller who was the first, to my knowledge, to suggest in the west, that an Art School should be conducted on a "workshop principle." The thing is so simple that the first idea which occurs to one, is why it had not been put forward before, and I was both delighted and surprised to find that this "workshop principle" was in vogue in the Madras School, when I took charge two years ago.

When the idea was broached in London, it was ridiculed by many inexperienced persons too conservative to profit by new ideas, but the only reasonable criticism

then was that it was not practicable in London Schools.

To explain more fully what is understood by this "workshop principle"—it means that the students work together under a practical workman *who also works* at his art with them. The student, therefore, continually sees before him a man who has "arrived"—a skilled workman executing some fine design which, though they may not at once hope to emulate, they are at least being made familiar with the way the thing is done. It seems to me a pity that Schools of Art are a necessity, but so long as they are, no better method of teaching is, to my mind, possible.

The one obvious drawback to such a system is that the workman though he may be as skilful as can be got may still not be a man of good artistic taste or judgment. He may be particularly keen on doing some sort of work which will display his technical ability to the utmost but which does not produce a work of art. It is here, in the direction of the work to be done, that the head of the institution is of most artistic use. He should be not only conversant with many crafts, but a master of one at least and a man of catholic and wide interests and sympathies and fine artistic taste and perception.

This workshop principle of which I write is in reality very old, though schools of art are comparatively modern institutions.

The artists of olden times knew of no "school" except the master's studio or workshop and there they served their apprenticeship and were gradually initiated into the various methods and usages of the particular craft; whether painting, or carving or what not, carefully and slowly. The modern school which seeks to partly replace this old system of apprenticeship can do so only by intensifying the old methods, and if the student is turned out 'finished' in a less time than formerly, he may still be quite a good workman, lacking only in the larger experience which the older method gave him,

Indeed, in a well conducted school, he might readily be even more experienced in some ways, especially theoretically and in the matter of design than had he served his time as an apprentice.

The school would not look upon him as a new comer who must in some way pay for his instruction by making himself useful at odd jobs and the tedious but necessary processes which might as well be done by unskilled labour.

So far as the actual conduct of a School of Art goes, local circumstances will affect the curriculum, the artistic crafts known or practised in or near a particular place, and other crafts new to the place which may be of benefit to already existing industries would be the first things to consider. If there is any likelihood of picture painters working successfully after their training in school, likely students should be encouraged to study painting and drawing with this object in view—the difficulty in Madras in this respect is to get really good teachers, and poor teaching is almost worse than none. Drawing masters, too, for employment in schools of general education should be taught, though, here again the same difficulty as to teaching crops up.

Of the artistic crafts, ornamental metal-work and wood-carving and jewellery are among the most important in Madras.

As an example of how a new craft may help along one already more or less flourishing, delicate enamel work is taught with the idea of improving jewellery.

Schools also can do much here to keep up a proper and efficient standard of workmanship. For example, the carpet weaving industry has been benefitted by the use of vegetable dyes solely, in place of the more gaudy and less beautiful synthetic imported dyes. Furniture making, too, would be greatly improved if the ordinary tradesmen followed the patterns and careful workmanship of the best school work, and the metal-work of the country, so important a craft in almost every part

should look to the schools for improvements in patterns, and in alloys.

The greatest mistake that has been made in the Madras School and many minor schools of the south, has been in allowing them hitherto to be regarded as convenient repair shops, always ready to undertake any odd job which no one else would care to do. It is thus that any proper arrangement of work or method of teaching has been entirely impossible in the past.

Another mistake is in looking to a School of Art as a place where experiments toward the starting of new industries is desirable.

This should be the work of either a separate Government department, or, better still, of enterprising individuals, who might, if successful ultimately, benefit by their own Pioneer work. An instance I have in mind, is of a potter, at Kumbakonum who has been for some time past, experimenting on his own account with glazes and clays. He is now beginning to reap his reward by finding a ready sale for his wares.

To return to the actual conduct of Art Schools, discipline is a thing which needs most serious consideration. Artists are proverbially not amenable to strict discipline, and I deprecate enforcing very strict rules in this respect. There is a good deal in "the artistic temperament" and in working when one "feels like it," though, unless some discipline is maintained no school would be possible.

So long as my boys do a fair amount of work and show an intelligent interest in that work and do not interfere with others who wish to work, I am fairly satisfied.

Young boys cannot concentrate their minds on any work to good advantage for long stretches together. So I divide my school day into three working periods of two hours each, with intervals for recreation between. The result is an increased interest in the work in hand and no more tired boys sleeping at their desks or benches.

The school run on the workshop principle differs

from the ordinary workshop in one particular in that all the students are required to draw for some part of each day.

Many a good workman would be more efficient with a knowledge of drawing, and for carpenters and metal-workers, a knowledge both of decorative drawing and enough simple geometry for practical use is desirable.

Ornamental drawing can best be taught to young students by copying and adapting good specimens of old work. To put a student in front of a natural object, such as a plant, and expect him to evolve a design that is, something conventional, from that, without previous knowledge of ornamental forms, is to court failure.

There is hardly any natural form worth using in ornamental work which has not been already used in the best possible way, and to familiarize the students with the best ornamental forms is giving them something of real value. Particularly able designers may find it possible to do something new, but only after acquiring an intimate knowledge of old work.

Ornamental drawing is generally taught to the best advantage by copying from flat examples, and a facility in the building up of conventional foliage, peculiar to Indian work, takes the place here, of the well known acanthus leaf ornament of the west. It is the backbone, the foundation, of all ornament and whether it nearly represents actual leafage in nature or not it is still the great essential in designing. Other well known units or design, the mango, the peepul leaf, the lotus, and the host of grotesque and animal forms commonly found in old work should be thoroughly well taught to the student.

Improvement may be made by references to nature and by becoming familiar with certain well defined natural characteristics, such as reasonable anatomical structure, and simple and possible growth. Even a grotesque form should look as though it might be possible and joints and legs should not be so far from nature as to be ridiculous.

I do not wish to dwell here on the other phase of drawing that is, by the western method from natural objects. It is essential, if drawing and painting by western methods is to be practised, that a knowledge of rendering objects as they appear to the eye be gained. This is a matter of close observation, of teaching the pupil to see accurately, more than anything else.

There are some troublesome points which are often put to me for explanation, one of the most frequent questions is: "What is meant by 'Indian Art.' " To the European the term simply means works of art produced in some part of India, and although they may vary and be as diverse as the Taj Mahal and the temple at Rameswaram, there is still a quality about them which the foreigner associates with this wonderful collection of countries and which to him is as distinctly "Indian" as, say, Russian and Spanish work is "European" to an Eastern person.

Another difficulty which often occurs is the modern separation of "Decorative" or "Ornamental" from "Fine Art."

Fine art is generally understood to mean either pictures, or works of sculpture complete in themselves and not of necessity forming a part of any ornamental scheme.

This is a quite modern distinction, for many works of art other than separate pictures or statuary could as well be classified as "Fine Art" from their superlative beauty and skill of workmanship.

I have not touched on the many drawbacks which influence art teaching here, such as examinations, and the great amount of office work expected of the heads of schools, which often leaves little time for actual teaching or artistic direction, but there are so many compensations that even these unusual considerations are not so serious as might be. The Indian student is about the best material available for teaching, very receptive minds and great skill of hand are common characteristics, and the only very

serious difficulties which confront the teacher is the lack of initiative and the general feeling that to-morrow is just as good a day as to-day.

INDUSTRIAL DEVELOPMENT OF INDIA.

BY J. E. O'CONOR, ESQ.

The predominating industry of India is that of the cultivation of the soil, for more than two-thirds of the population are dependent on the land. This overwhelmingly important industry is the one which more than all others needs close attention, and careful consideration. If it is to be improved the first measure to be adopted is to lighten the burden of the taxation which it bears. Why should the industry of the land be taxed more heavily than any other form of industry? It is true that the load is not so heavy as that which was placed upon it by former rulers, but we do not gain much by taking as a normal standard the methods and amounts of taxation of former rulers. It is more to the purpose to consider whether our system of land taxation is capable of justification when judged by the principles of Western Economics, and when this comparison is made there is no doubt about the answer. It may be that we are not taking more from the cultivator by way of taxation than 25, or 20, or 10 per cent., where former rulers took 50 per cent., but it seems to me that even the figure of 10 per cent. would be regarded as excessive and restrictive if it were applied to the customs duties or the income-tax, and it is certainly excessive when applied to the land. I have raised this point before, and was met in the Pioneer by the jeer that if the Government demand on the land were reduced the money left to the cultivator would be wasted on wedding feasts. The jeer reminded me of the barbarous justification of the imposition of excessive rents by the Irish landlords: "the best manure for the farm is to salt the land

with a high rent." The journal which pronounced its brawling judgment on my proposition frequently fills its columns with dissertations on the indebtedness of the cultivator and on the existence of vast buried hoards all over India. Now, if the cultivator spends his money on marriage festivities and would so spend more if he had it to spend, and if he is so hopelessly indebted as is stated, where do all these vast hoards come from ? I have no doubt myself that the hoards are mythical and that in the main the population dependent on the land lives from hand to mouth and has no money to hoard. The relevancy of this matter to discussions on the industrial development of India lies in this consideration : with two-thirds of the whole population living in such conditions where are you to find an adequate market and an expanding demand for the manufactures which will accompany industrial development ? It is very well to be able to manufacture and to set up factories and industrial establishments, but the persons who are asked to supply the capital for such industries will naturally ask what you propose to do with the goods when you have made them. They are made to be sold, but where are the people to buy them ?

Until the condition of the agricultural population is materially improved, industrial development in India must necessarily be slow, insecure, and discouraging. The first step to be taken is to reduce the share of taxation which that community pays to the state by treating land like any other form of property subject to the same rate of taxation, no more and no less. The worthy and well-meaning people who have been, within my own recollection, writing and talking for the last forty years on the promotion of industrial enterprise in India have consistently ignored this point, thinking apparently that it is a separate and independent matter with which they have no practical concern. They are seriously in error. It is impossible to secure any material development of industry until the agricultural community are in a position to become customers

on a large and increasing scale for the goods manufactured. To this end, what is needed first is the liberation of the agriculturist from the fetters of taxation imposed on him in an undue degree compared with the taxes on people engaged in other industries, large or small. The next thing needed is intensive culture. At present the land produces really less than half what it would be capable of producing if it were better cultivated. I do not mean in the least to disparage the Indian cultivator, who really does the best with his land that could be done by anybody situated as he is. But he would do much better if he had the capital to put on the soil in the shape of manure and if he were acquainted with the laws which govern the processes he works by rule of thumb. The capital is non-existent, but part of it would be supplied if the land revenue were reduced and the other and larger part would be supplied if capital could be concentrated in Banks and supplied to the cultivator as is done in agricultural countries in the West, as for instance Ireland, Canada, the United States, at a moderate rate of interest. I commend this point to the gentlemen interested in industrial development. Let them take steps to found a Bank with numerous branches for the special purpose of advances for agricultural improvements. The state is doing something of the kind by making takavi advances, but the state never does that kind of thing well, and many people in India, as elsewhere, dislike transactions with the state, no matter how good may be the motives which inspire the action of the state. This business would be done much more efficiently by a Bank, but there is little use in a small Bank of this kind. It should be an institution with considerable capital and numerous branches spread abroad over a wide area. If the agriculturist is to utilise the advances to the best advantage he must learn the laws which govern agricultural practice. The state has endeavoured to do something in this line for a great many years, but has done it in a limp and unpractical way.

The agricultural colleges and the experimental farms have set themselves mainly to modify the agricultural methods of the cultivator, and naturally without success, for the methods are the outcome of the experience of ages and are right in principle. What is needed is that the agriculturist should know the scientific reasons on which he unconsciously bases his practice, for his practice is in fact applied-science, that he should learn the theory of his trade like the engineer, the builder, the sailor, and every other artisan. This is just where the Government Colleges and Farms fail, but how is their place to be supplied? That is a question for those to consider who are interested in industrial development. The prime necessity, however, is capital. With this the cultivator can soon be taught—and it will surprise many people to find how little teaching will be required—to so treat his live-stock as to double their working capacity and prolong their lives in health, to so improve the receptacles for the storage of his grain as to materially diminish the loss and waste from rats and damp, to so improve his implements as to reduce his labour by increasing their efficiency, to purchase better seed, to use means for contending with blights and insect pests, and so forth.

All this has a very direct and pertinent reference to industrial development, for all such improvements indicate the creation of an ever-widening market for material and appliances capable for the most part of being manufactured in India. With the increased prosperity thus attained in the agricultural community there will necessarily be a larger demand for articles of personal necessity. Consider, for instance, what would be the effect on the spinning and weaving industry if the 200 millions of people concerned with and dependent on the land were to increase their consumption of cloth by even a yard or two per head in the year. What again, would be the effect on the building trade if dwellings and granaries were constructed in less primitive fashion than the people are now content

with ? And on the tool-making industries if improved and efficient implements were in demand ?

Turning now to manufactures, the first point I wish to note is that industries conducted in a small way and by hand are of little use to-day, and it is not wise to encourage their multiplications. Such industries inevitably succumb as soon as they are brought into competition with the products of factory labour, and each mile of railway extension increases the vigour of such competition. The example of the hand-weaving industry should be a warning to those who are inclined to encourage the expansion of small hand industries. The misery which is inflicted on poor people whose living is taken away from them by the resort of consumers to the cheaper goods made in large factories is most painful to any man who has seen it, and yet there are persons who urge the state to revive such industries in places where they have been paralysed. No thinking men can expect anything but evil to come from ill-considered projects of this kind put forward by well-meaning enthusiasts.

The concentration of labour is a prime factor in the development of Indian industries, and this means the employment of large capital in the construction and maintenance of industrial establishments. Who will provide the capital required ? In Bombay the answer has been given by the enlightened native community—Hindu, Parsi, and Muslim,—of that fine city, whose citizens set a splendid example to the rest of India. But where do we find any serious emulation of the endeavours which have made Bombay what it is ? Elsewhere in India the amount of capital invested in industrial undertaking by the Indian community is almost, by comparison with Bombay, non-existent. No real, effective, appreciable progress can be made until Indian capitalists turn to industrial undertaking for the employment of their money and until large Banks are set up from which working capital can be obtained as required. Briefly, what must

be done in India is what has been and is being done in the countries of the West and in Japan.

With the concentration of capital must be associated technical skill, and I hope the leaders of the industrial movement will not make the mistake of thinking that the acquisition of technical skill may be limited to the artisan class. It is, on the contrary, essentially necessary that the younger members of families of good social status should learn the best methods of running a large factory and qualify for responsible executive positions in such a factory. Technical Schools and Colleges are wanted, and as usual the tendency is to look to the state to supply them. Let me recommend, however, that the community should found them and should be content with grants-in-aid from the state. The late Mr. Tata of Bombay gave a noble example of how such things should be done, and I wish that there were even ten other men like him, patriotic, independent, far-seeing, and splendidly public-spirited, ready to do something like what he did.

The next thing to be considered is, what should be the things to be manufactured, and here I lay stress on the need for making only those things, for which there is a large and increasing demand, and for the manufacture of which all the conditions are suitable. It is idle to go about the manufacture of glass, for instance, seeing that the use of glass by the Indian people is very restricted. If indeed the mass of the people were to glaze their windows there would be an excellent opening for the manufacture of window-glass ; but as the use of window-glass is unknown in practice outside the large cities, and even there is by no means general, the manufacture of window-glass on a large scale is out of the question, and on a small scale it could not be made at a price to compete successfully with imported glass. There has been much talk again about the manufacture of matches, but, as far as I know, there is no wood in India—except in the Himalayas—fit for match-making, and such a manufacture

could not possibly compete with foreign matches in the very favourable conditions in which the latter are made. I have also heard much from time to time about the manufacture of silk, and it is in fact carried on in Bombay, but the market for silk is chiefly to be found in Burma, the Indian consumption being relatively quite trifling. There is little sense in manufacturing goods for which there is but a trifling, non-expansive or no demand.

What then are the goods to which attention should be directed? Well, it must be admitted that in the primitive conditions which exist in India there is no large list of articles to be set out. The sources of profit for manufacturing industries generally are to be found in the production of material for other industries, e.g., iron, steel, machinery, and in the consumption of the lower and lower-middle classes, who comprise the vast bulk of the population. But these classes in India have very limited resources and their wants are equally restricted. It is no exaggeration to say that two-thirds, or perhaps three-fourths, of the population live in hovels in which there is no furniture but a charpi and some earthen or metal utensils, no carpets, no floor-cloths, no door-handles, locks, or hinges, no lamps but an earthen chirag, no decorations on the walls, nothing of the things which the poorest have in Europe from the supply of which things the industrial community makes its living and its profit.

It is necessary in the circumstances that capital should be employed upon the manufacture of the article which are used by the people at large, not upon the articles which are used by the few. There is a wide field for the extension of cotton manufacture, to begin with. I have no doubt that as prosperity increases in India room will be found for ten times the number of mills now existing. Then there is the manufacture of the tools and apparatus to which I have already referred. Ploughshares should be made in factories as elsewhere, and could be made more

cheaply, and beam of the plough might also be so made. So with the hoe and the kurpi. The metal utensils should be made in large factories, for already the hand-made vessels are being supplemented, and will presently be superseded, by machine-made metal vessels imported from abroad. Take again the leather articles which are required by the mass of the people. If they could get cheap shoes their use would be greatly extended, widely as they are used at present. Women in particular would soon take to the use of shoes of elegant make though cheap instead of going barefoot or in clumsy slippers as at present. To this particular industrial development there is of course the religious objection of Hindus, but Muslims can (and do in Bombay) undertake such enterprises which should certainly carry a very good prospect of profit. Then again there is room for earthenware factories in which could be made more neatly and cheaply the articles now clumsily finished, though of good design, by the potter. In this country, Doulton's and other companies make their principal profit out of common articles of universal use. There is also an excellent opening for the profitable manufacture of sugar, which is so widely consumed in India. I might go on with the list, but it is probably unnecessary. All intelligent natives of India will be able at once to name articles which are in general use, the manufacture of which is carried on in practically every village in a laborious and in effective way, and which could be manufactured much better in large factories and much more cheaply.

On one point I wish to convey the most earnest warning. I trust that nobody connected with this movement may ever persuade himself that he is doing well for his country by boycotting imported goods. That practice does no good at all, but it works a vast amount of injury. All imported goods are paid for by exported goods. If there are no imports there can be no exports; if there are no exports there can be no imports. The price

which is paid for imported goods is represented by exports, and if a boycott of imported goods is effective it has the effect of reducing the production of exported goods in the measure of the reduction in imports. If it is said that the place of the imported goods will be taken by locally made goods, the answer is that the local manufacture is exhypothesis not so economical as that of the imported goods and that the consumer must pay more for the local goods, with the result that his consumption must be reduced. If it did not pay to produce certain articles under the operation of free imports they could only be produced when the imports were cut off at a higher price, and here is the injury to the consumer who must pay the higher price. Any body who risked his capital on an industrial venture based on such a rotten foundation as the violent extrusion of competitive foreign goods would discover his mistake before long by the loss of his money, for no man in the purchase of goods will continue longer than he can help it to pay a higher price for goods made, say, in Agra or Dacca, than for goods made in Europe, or Japan, or the United States, and a reversion to the natural order of things is sure and certain. The natural order of things is that a country produces the things for which local conditions are most suitable and purchases from elsewhere the goods for which local conditions are not so suitable. Indeed, the measure of the foreign trade of a country is a measure of its material condition, and the more that trade increases the better for the country.

SCIENTIFIC AND TECHNICAL EDUCATION.

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The ideal put forward by Lord Macaulay, in his famous minute on Indian Education, was to introduce a knowledge of western arts and sciences, through the medium of the English language. Although he won his point, and the

higher education of the country has since been conducted in English, one cannot help feeling that to some extent the end, at which he aimed, has been neglected, and that the polishing of the tool he recommended is often treated almost as if it were the main object of effort.

Clearly what Lord Macaulay had largely in mind was the introduction of scientific and technical education, to replace the immemorial system in which the ancient scriptures were committed to memory by the pupils, under the guidance of instructors, who often did not themselves understand what they taught. Although the forces of conservatism have been strong, and seem sometimes to have been aided by those who have the perfectly laudable aim of imparting a sound literary education to the thousands of Indian students who desire it, yet progress is at last being made.

Technical instruction, pure and simple, is now being rapidly developed by the efforts of Government, Municipal bodies and private benefactors. Colleges of Medicine, Agriculture and Engineering have been built, or enlarged, provided with the most modern equipment and with staffs composed of earnest instructors and investigators, trained in the best laboratories and workshops of Europe and of America. Technical schools are being founded, where instruction in the vernaculars is given to the sons of workmen, who are taught the use of modern tools and trained to take their places in modern industry.

The only danger here appears to be that, in certain branches at least, the supply of trained men may exceed the demand for their services. Merely to give a number of youths an expensive training will not, of itself, revive the decaying industries of India, or start fresh ones. Other and more serious labours are required from capitalists and merchants. Risks must be run, manufactures must be started, markets built up. Above all employers must learn the value of the trained man, and must be willing themselves to take their proper part in his training. The boy from the technical school or college must be given a chance in the shops and factories.

* When a youth first leaves school, and starts work under

commercial conditions, he may not always at once show up to advantage beside boys who have not had his educational advantages, but have been brought up in the hard school of shop or mill. He should, however, not be judged too hastily. Time should be allowed him to become accustomed to the severe conditions of commercial life, when it should be found that, in many cases, his grasp of principles, his avoidance of rule of thumb methods, his cultivated intelligence and even his gentlemanly bearing will make him a much more valuable man to his employers than those who have not had his educational advantages.

Much of the enormous recent commercial development of the United States and of Germany is due to the thorough exploitation by manufacturers and capitalists of the college trained man ; while a certain backwardness which may be observed in some British industries may be traced to the fondness, on the part of many firms, for the so-called " practical " man, who has broken his way up from the ranks, without having had the chance of a thorough technical education, and who, though often very successful, might have been still more so if his employers, seeing his ability, had given him a chance of attending a proper school.

One other point in connection with technical education is of the greatest importance. The impression one gains in the technical colleges is that nearly all the students are the sons of people of very moderate means. Very few, if any, of them appear to belong to the families of the wealthy manufacturers, whose sons should be training themselves to be officers in the industrial army. How are our Indian capitalists educating their boys ? Wealth is a stewardship, and the accumulation of great fortunes in individual hands can only be excused on the ground of important services rendered to the country by those holding them.

The sons of a rich man are in duty bound to prepare themselves, by every means in their power, for the future administration of their fathers' wealth ; learning how to use it to increase the prosperity and happiness of their fellow men. A man who in the future will draw a large income from agricultural sources should, in general, study agriculture thoroughly and scientifically, and devote his life to the

agricultural development, not only of his own estates, but also of the surrounding country. The son of a manufacturer should prepare himself for his life's work by a thorough course in Mechanical Engineering or in industrial chemistry, if he cannot find a school or college giving a course in the special line of industry to which he will afterwards have to devote his energies. How many captains of industry have seen, in their old age, the business to which they have devoted the years of their manhood crumble to ruin, because they have not properly trained their sons to succeed them.

Although something has been done, the position of science teaching, in the Bombay Presidency at least, cannot be regarded as at all satisfactory. It will be agreed that there are few countries in which a general diffusion of the knowledge of the methods of modern science is so greatly needed as it is in India.

The conquests of science during the past century have given us practically a new revelation as to the nature of the universe and the methods of creation. What before may have been dimly guessed at is now vouched for by evidence which can hardly be controverted. We see the golden age before us instead of behind, and can cherish the hope that, as the human race has visibly progressed from the dim beginnings whence we can see it emerge, so the progression shall be continued, man working together with God in the great and continual effort of creation.

Who can estimate the possible future effect of this immense development of what, after all, is really the ancient method of arriving at a knowledge of truth, in an intensely religious country like India ?

The knowledge of sanitation gained by your ancestors, through slow and sad experience, has developed into a ritual of cleanliness. Their observation of the laws of infection has lead to rules, having the sanction of religion, as to the disposal of the dead. Their ancient experiments in Eugenies, the science of human breeding and heredity, have given rise to the wonderful system of caste, which, in spite of abuses, has had such wonderful results in preserving the physique and abilites of your ancestors to their descendants, though surrounded with

tribes and races of different types. Much further study will be needed before the laws of inheritance of the different human qualities, bodily and mental, are fully worked out but it does not seem an impossible dream, having in view the careful regulation of marriage which already exists, in this country, that voluntary associations for the improvement of the race may be formed, the marriages of the members, and of their children, being arranged on scientific principles, so as to perpetuate, and even by careful selection to improve, the best elements in humanity. Is it too much to hope also that religious sanction may be given to the rules imposed by more modern discoveries as to the cause of disease; so that even the lowest classes of the population will be willing to co-operate with the sanitary authorities in stamping out preventible disorders?

The study of science should begin in the schools. The practice of confining such instruction to the study of a few isolated chapters in a School Reader cannot be regarded as satisfactory. Science badly taught has little value from an educational point of view. Its real value is in the training which it gives in methods of careful observation, experiment and measurement, and in the insight it gives into the manner in which knowledge is to be obtained by means of these methods. Merely to learn that Professor X says this, or that Dr. Y is of a certain opinion, does not take a pupil very far; he must learn how to form his own deductions from evidence obtained by himself, or set before him by his teacher, and thus convince himself of the truth of the law of cause and effect, and of the regular and orderly progress of phenomena.

The objection commonly urged against the introduction of practical work in science into the High Schools is that the expense would be prohibitive. Much however can be done by an earnest teacher with very simple and inexpensive apparatus. Probably the greatest difficulty is in obtaining competent teachers. Promotion probably goes in the majority of instances to the teacher of language and literature, or of mathematics, and the result is that the best men are not attracted to science. It is to be hoped that something may soon be done to improve matters, as a mere

knowledge of scientific facts, without any idea of the methods by which they are obtained, is almost worthless.

Knowledge of truth should be cultivated for its own sake. How few are the students of any branch of learning who recognise this in these days compared with those who study simply with a view to earning a living for themselves and their families ! To some extent this is unavoidable ; but one could wish to see the love of learning for its own sake grafted on to the love of learning for the sake of a livelihood. How few continue their studies to any purpose after they have left college? How little original work of any kind is done in the country? Why is it that, after so many years of higher education, European professors still have to be imported for the colleges, and head masters and inspectors for the schools ? It does not appear to be due to lack of ability, but rather to a general lack of that enthusiasm for knowledge which has produced such wonderful results in other countries.

For years laboratories have been open in different colleges in the Bombay Presidency, where it is possible to do the practical work required for the B. Sc. or the M. A. degree in science of the Bombay University, yet how few have taken either of these degrees? When enquiries are made as to the reason for this, one is told that there are very few openings for trained scientists in India. What are the sons of your Rajahs, your wealthy Zemindars, your merchant princes, your bankers, your manufacturers doing for the spread and advancement of science and of learning? If they are in college at all they are probably taking "an all round course," a continuation of their school courses, and the last thing they think of is to specialise to a particular line and devote their lives to an endeavour to enlarge the bounds of knowledge in a particular direction.

The generosity of the Tata family has founded a Research Institute in Bangalore, that of Sir Jacob Sassoon will shortly provide a well equipped Science College in Bombay. It is to be hoped that full advantage will be taken of the splendid facilities to be provided, and that not only here, but also in the Arts Colleges, the spirit of scientific research, in natural sciences, and also in Mathematics, History,

Political Economy, Philology, Archeology and Anthropology may be encouraged and developed. Then will India again take its proper place amongst the enlightened nations, ignorance, superstition and evil will hide their heads, the moral tone of the teeming millions of the country will be raised and health, wealth and prosperity will reign.

INDUSTRIAL DEVELOPMENT AND ELECTRIC POWER TRANSMISSION.

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The most striking features of modern civilisations are the importance now attached to the study of Nature, and the intense intellectual activity displayed in the application of scientific knowledge to the construction of various devices intended to minister to the happiness and comfort of the well-to-do classes of the community. Whether the development of modern industries has up to the present been in any material degree instrumental in promoting the happiness of the human race as a whole may, in view of the conditions of life prevailing among the poor of our large manufacturing centres, be very well questioned; but nobody can doubt that so far as material comforts and the alleviation of physical suffering are concerned, the standard of life is to-day immeasurably higher than it was a few centuries ago; and that luxuries which are now within the reach of people of moderate means were formerly undreamt of by the most privileged sections of the community.

In the gigantic industrial development of modern times, which has added so greatly to the material comforts of life, in the enormous expansion of commerce, and in the vast improvements in the means of transport and communication which have rendered such expansion possible, electrical science has played no mean part. Not only has it been instrumental in stimulating the

development of many of the older industries along new lines, and in simplifying and cheapening the cost of production in many cases, but it has created a whole series of new industries, the very existence of which depends on the employment of electrical methods. To mention only one instance, the introduction of the electrical furnace and the consequent possibility of employing temperatures which were formerly unattainable, has created an entirely new branch of applied chemistry and familiarised us with a new set of chemical compounds of great industrial value.

No one who has been following the trend of industrial development in recent years can doubt that in the near future electrical science is destined to play an increasingly important part in all industrial processes and in all schemes of power distribution from large generating centres. It is the purpose of this paper to consider briefly the relation of electrical power transmission to industrial development as dependent on cheap generation of power.

The achievements of modern industry may be said to be primarily due to the following causes. (1) The introduction of automatic tools and machinery for wholesale manufacture, the operations involved having formerly been carried out by hand at an infinitely slower rate; (2) the perfection of methods of measurement and consequent introduction of great precision into machine tool work, with the possibility of turning out completely interchangeable parts; (3) the discovery of various new products of great industrial value and the invention of new processes and methods by means of which the commercial value of many of the older products has been greatly enhanced; and (4) last but not least, the development of methods of cheap power generation and distribution. It is with this latter question that we are more particularly concerned.

It is no exaggeration to say that modern industrial enterprise depends entirely on the possibility of generating power cheaply and insufficiently large quantities. Were the

various types of prime movers—steam, gas and oil engines, water-wheels and turbines—all suddenly destroyed, or the sources of energy whence their power is derived suddenly removed, both industry and commerce would be completely paralysed.

In view of the great importance to modern industry of a continuous power supply and the well-known fact that we are at the present time exhausting many natural sources of energy which cannot be replenished, the consideration of the available sources of energy and of their extent and probable duration has become one of the greatest problems which the industry of the future will have to face. Already do we realise that so far as some sources are concerned, the end is in sight, and that we must turn our attention elsewhere if the increasing demand for power is to be met.

Every form of energy at our disposal may ultimately be traced back to one great source—the Sun. It is to the Sun that we owe those vast stores of fuel—solid, liquid and gaseous—which feed the furnaces of our great industrial centres. The rate at which earth is receiving energy from the Sun has been determined to be about 7000 Horse-power per acre of the earth's surface under the most favourable conditions—a high Sun and a cloudless sky. If we could utilise even a small fraction of this directly for power purposes, the problem of our future power supply would be satisfactorily solved. Unfortunately in the light of present knowledge, there appears to be but little prospect of any commercially successful scheme for directly utilising the Sun's radiant energy, and we must be content to consider its indirect utilisation by taking advantage of the various physical and chemical changes which are produced by the Sun's radiation.

All sources of energy may be divided into two great classes : (1) those which represent accumulations of energy gradually formed under the action of the Sun's light and heat in the course of countless ages and which, when once

exhausted, cannot be replaced. To this class belong the important fuels represented by the different varieties of coal, peat, mineral oils and natural gas; (2) those which are being replenished by the Sun's action as fast as they are utilised. To the second class belong water-falls, tides, winds, and the various forms of fuel derived from growing vegetation.

The distinction between these two classes is a vital one. For so long as we depend on the first class—which is very largely the case at the present time—we are exhausting supplies of energy which are sooner or later bound to come to an end. We are depleting the world of its reserves of energy and depriving future generations of all the advantages connected with the possession of such reserve stores; while in drawing our power supply from any source belonging to the second class, we have the comforting assurance that we are not playing the part of spendthrifts, but are merely utilising energy at a rate not in excess of that at which Nature is able to supply us with it.

The considerations outlined above have exercised no small effect on the development of methods of power generation and distribution. By far the greater bulk of the world's power supply at present depends on sources of the first class, and every day we are nearing the verge of bankruptcy. It is our manifest duty under these circumstances to ward off the evil day as long as possible and to exercise the utmost economy in the utilisation of the irreplaceable fuels at our disposal. Development in this direction may be said to have proceeded along two main lines: (1) Improvement in the efficiency of the various types of heat engine now in use, and (2) centralization of power generation. Improvements along the first line have been mainly due to a general diffusion among engineers of a knowledge of the science of thermodynamics, while centralization of power generation has been rendered commercially feasible by the development of electrical methods of power transmission and distribution.

If the trend of modern practice be a reliable guide, the power supply of the future will be derived from comparatively few generating centres of very large size situated in the immediate neighbourhood of the sources of energy, the wholesale transmission and retail distribution of energy being effected by electrical means. The advantages offered by a single large generating centre as compared with a number of smaller power plants may be briefly summarized as follows: (1) The capital cost per K.W of buildings and plant is greatly reduced; (2) the efficiency of the prime movers is improved; (3) the running costs as dependent on salaries and wages are decreased; (4) the load factor is improved, with consequent increase in the all-day efficiency of the plant. The above advantages could not, however, be realised without a highly efficient method of transmitting and distributing the energy over large areas. Such a method—the only commercially feasible one at the present time—is supplied by electric power transmission and distribution.

We are thus led to conclude that in the development of industrial enterprise, which depends on the possibility of a cheap supply of power, electric power transmission is destined to play a very prominent part.

Many concrete instances may be cited in illustration of the above statements. We shall, however, content ourselves with drawing attention to only one example of the rapid headway which electric power transmission is making at the present time.

Few districts are so favourably situated with regard to cheap fuel supply as that surrounding Newcastle-upon-Tyne, in the north of England. Before the advent of electric power distribution, this district teemed with isolated steam power plants. So far as appearances were concerned, no more unpromising field could well have been imagined for a general system of electric power supply. Fuel was extremely cheap, and all existing manufacturing concerns already possessed their

own independent power plants. In the face of this apparently hopeless outlook the Newcastle-upon-Tyne Electric Supply Company ventured on establishing large generating stations and offering a supply of electric power to ship-building yards, railways, collieries and numerous manufacturing concerns. Contrary to what might have been expected, the affairs of the Supply Company prospered, and the demand for electric power went on increasing by leaps and bounds. During the last four years the average rate of increase has been about 20,000 Horse-power a year, and the company is at present engaged in carrying out considerable extensions of their generating plant. The isolated small power house is rapidly becoming a thing of the past in this district.

We have seen how by increasing the efficiency of power generation, electric power transmission and distribution enable us to reduce all unnecessary waste in the utilisation of the irreplaceable fuel supplies of the world. It is only natural to turn next to sources of energy of the second class—sources which may be regarded as inexhaustible so long as the Sun continues to radiate energy at the present rate, and to consider the part which electrical power transmission is likely to play in connection with such sources.

When the available supplies of coal, peat, petroleum and natural gas are exhausted, the world will have to look for its supply of power to (1) fuels whose rate of production can be made equal to their rate of consumption, and (2) water power. Various other sources of power—such as tides and winds—are not here considered, as it is doubtful whether their utilisation on a large scale could be made a commercial success.

Of the various possible fuels of the future—fuels derived from growing vegetation—there is only one which seems to hold out any promise—namely, alcohol. Such fuels as wood and straw must always play a subordinate part, and they are required for other purposes. Alcohol could be most

cheaply manufactured from potatoes, and if it is destined to play any large part in the world's future power supply, the cultivation of potatoes is bound to increase to a considerable extent. The corresponding type of power house would contain large alcohol motors driving electric generators, the power being transmitted and distributed electrically.

By far the most promising source, however, of future-power supply is to be found in water-power. Probably few people realise the large amounts of power which are represented by this source. Even in the United Kingdom of Great Britain and Ireland, where the amount of water-power has frequently but erroneously been stated to be negligible, it is estimated that at least one million Horse power could be developed without excessive cost. The amount of water-power available in the United States of America is well over 200 million Horse-power while the total amount of power at present employed for all industrial purposes in the same country, does not exceed 30 million Horse-power. Canada is a country of great possibilities from this point of view. In the province of Quebec alone, water-power to the extent of 18 million Horse-power is available. I have unfortunately been unable to obtain any reliable statistics for India ; but there can be no doubt that the amount of water-power available in the mountainous regions is very considerable and greatly in excess of the present industrial requirements of the country. One of the great difficulties in connection with the utilisation of water-power in India as well as in some other countries is the fluctuating nature of the water-supply. In view, however, of the important part which water-power is undoubtedly destined to play in the industrial development of the future, the difficulty presented by the fluctuating nature of the supply will in course of time be met by the construction of reservoirs of sufficient capacity, in spite of the large initial expenditure which this measure will involve

in many cases. Water-power and irrigation schemes will go hand in hand, and cannot fail to react most favourably on the agricultural and industrial development of India.

In concluding this brief paper, I may, perhaps, be allowed to draw attention to one aspect of electric power transmission and distribution which has perhaps not been sufficiently insisted on. The introduction of steam-power though resulting in an immense increase of industrial activity and the cheapening of many of the ordinary commodities as well as the luxuries of life, cannot be said to have been unattended with numerous disadvantages, which spelt acute suffering to the lower classes of the community. No one who has experienced the depressing effect of a manufacturing town of the old type—with its countless chimneys belching forth smoke and poisoning the atmosphere for miles around, rendering everything grimy and suggestive of poverty, squalor and misery,—can fail to feel a deep sympathy for the workers who are doomed to pass their entire lives in such dismal and uncongenial surroundings. If with this we compare the cleanliness, comfort, and cheerful aspect of a manufacturing centre which is supplied with electric power, the contrast will point its own moral. Truly it may be said that electric power transmission has not only been an important factor in modern industrial development, but that it is rapidly redeeming some of the most ugly features of modern civilization.

THE ARTISTIC TRADES OF BENGAL AND THEIR DEVELOPMENT.

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In order to protect myself from the possible accusation of occupying the time of a Conference devoted to industries, in the discussion of a subject which is largely a matter of

sentiment, I may state at once that I do so with intent. For the new spirit now being developed in the people of India is rapidly producing a desire for extreme commercialism which may lead to the extinction of a very valuable national trait. I refer to the well-established artistic instincts observable in almost every class of the Indian community. This has been an asset of the people of India, all through the ages, and to check the apparent decay of this cultured quality, should be the aim of every Indian who has the interests of his country at heart. It is, therefore, with the main object of endeavouring to stem the tide of what has been called the "plain cotton shirting influence," that this paper on an essentially art subject has been prepared.

It is a little difficult to trace the origin of the modern impression that Bengal is not a particularly artistic portion of the country. But the fact remains that it has suffered under this slander during recent years, and that the present time is commonly regarded as somewhat deficient in artistic industries. The indirect cause of this aspersion is climatic, and may be explained as follows :—

Architecture is the foundation of nearly all art, and the æsthetic claims of Bengal are usually airily dismissed by the unobservant with remark that the Province can boast of no good historic buildings. But the student of the annals of Bengal knows that at different periods great cities have risen and flourished on its soil, the architectures of which has been the admiration of all travellers. To take only one of these, Patna, the ancient Pataliputra, we are told on good authority that in the time of the Emperor Asoka, B. C. 269-232, this famous capital contained so many richly decorated stone edifices that they seemed to after ages to be the work of genii and beyond the power of human skill. But the insidious climate and peculiar geographical position of Bengal have covered these beautiful productions with many feet of silt, and the modern cantonment bungalow or ploughed field now screens from view even the foundations of these buildings. To come to a more recent age, Dacca, in the time of the Moghals, boasted of many fine examples of architecture, but the heavy hand of time and the destructive atmospheric influences have left but little to mark the glories of this flourishing period.

Budh Gaya, Gaur, and Puri, again are evidences, if further proofs are necessary, to indicate that Bengal has been, in many of the historic periods, one of the most artistic portions of the Empire.

These references however, it may be contended, are but echoes of the dead past, but it must be borne in mind that the history of a country's art is of the utmost importance in any efforts to resuscitate its latent possibilities. The wrong principle of ignoring previous developments in the realm of art and the substitution of trades foreign to the people or their locality, has been responsible for a lack of success in many of the somewhat superficially conceived schemes of the present day. Not that new ideas, processes, or methods are here deprecated, but any innovation must be most judiciously selected and carefully considered if the promoter wishes to avoid either an artistic or commercial failure.

At this stage and while touching on the historical aspect of the subject, it may not be out of place to refer to the great æsthetic traditions of one particular portion of Bengal, namely, Orissa. Apart from the art trades of a modern age, there are strong evidences of a keen artistic spirit still surviving in the inhabitants of this part of the country, which mark it as a very suitable ground for purposes of development. Past records contain many references to the artistic ability of the descendants of this ancient kingdom of Kalinga, and the examples of art that have survived, represented by stone and ivory carvings, indicate an excellence in these handicrafts which has been rarely attained in any other part of India. It is believed that it would not be a difficult matter to revive this hereditary instinct, and again galvanize into life the artistic impulses of the Ooriya.

Having called attention to the artistic past, and briefly alluded to the possibilities of the future, we may now turn to the present state of industrial art in Bengal. Several famous handicrafts are to be found, but the first place must be allotted to the beautiful muslins of Dacca. These, whether plain or flowered, have had a world-wide reputation for centuries and are still much sought after by buyers from east or west. But within recent years there have

been differences of opinion among authorities as to whether these manufactures can survive the competition of machine-made muslins. As a matter of fact with regard to the plain variety, which relies entirely on its fine texture for its fame, machines can be made to produce a much finer quality of muslin, but the demand for this is so limited that the mechanically woven article cannot be made to pay. On this account therefore the "abrawan" (running water) "shabnam" (evening dew) and the many other poetically named Dacca muslins which have been the pride of the Indian craftsman for generations, may, it is hoped, flourish for many years to come in spite of the demands of a more materialistic age. Continuing with the productions of this ancient capital of Bengal, another most artistic manufacture is that known as "kasida" embroidery. This is needlework executed in "muga" silk of an old gold colour on a white cotton ground. It is a common criticism to apply to Indian embroidery the stigma that the most beautiful designs worked in the most painstaking manner and in the richest of materials are frequently done on the cheapest and commonest of ground fabrics. To illustrate this observation this particular industry is generally quoted on account of the rich silk embroidery being applied on a common cotton ground. But one good reason and also an extenuating circumstance may be brought forward to combat this criticism. The former is that the embroiderer wishes the contrast between the rich decoration and the plain ground to be observed and thus produce an added emphasis to his conception; the latter is essentially the modern European opinion that cotton must be an inferior article, whereas the Indian material is an artistic and often finely hand-woven textile. It must not be supposed, however, that this explanation may also be applied to other Indian industries where the quality of the materials is open to criticism. As examples of this defect mention may be made of the most elaborate carving being executed on very faulty wood, paintings produced by means of the most inferior modern pigments, and fabrics dyed with the commonest and most fleeting mixtures. Everyone interested in the preservation of the art crafts of India should give their own personal help towards

preventing the utilization of bad materials and inartistic processes. The Schools of Art are endeavouring their utmost to instil into the Indian artizan that pride of craft and love of good materials which should be the birthright of every honest workman. But to return to the "kasida" embroideries of Dacca, and an interesting detail in connection with their market. It may not be generally known that this particular handicraft finds its principal sale among the Arabs of the Persian gulf, and there one may see in the bazaars of Bushire truculent Muhamedan tribesmen adorned with *pagris* and handkerchiefs the work of the left fingers of the peaceful embroiderers of Bengal. Another Dacca industry, somewhat smaller than the last, has also a curious fact connected with it. This is the manufacture of bracelets, rings, etc., from a certain variety of sea-shell. These shells are brought, in their raw state, from Ceylon to the bazaars of this town and there by means of the quaintest of implements converted into prettily decorated personal ornaments. But the origin of a trade in an inland town dependent on materials brought from the shores of a far off foreign island, is one of the many romantic mysteries which surround the art industries of India.

Continuing with a brief survey of the art trades of this province, the brocades of Murshidabad attract attention. These are good in design and appear to find a ready sale among many sections of the community. The business part of the industry is not neglected, and some of the firms employ sound up-to-date methods to keep their goods before the public. A trade in carved ivory in the same locality is not so flourishing, but in technique this work cannot compete with the wonderful manipulation of the Delhi or Mysore craftsmen in this material. Of silver work much might be said, as in one form or another this industry is to be found in nearly all localities of Bengal, from the rough barbaric productions of the hill tribes to the minute cleverly devised filigree of Cuttack. Both these forms have their virtues, while one aspect of this trade, based on the requirements of the west, has arisen within recent years at Bhowanipur, a suburb of Calcutta.

But even if time would allow, it would serve no useful

purpose here to produce a complete survey of the art industries of Bengal. This will be found embodied in several Government publications. The foregoing is merely intended to give a general idea of the capabilities of the Province in preparing articles which beautify the homes or adorn the persons of those whose pleasure in life is to be associated with refined and pleasing surroundings. At this stage, therefore, having roughly sketched the general artistic situation in Bengal, the other aspect of the subject may be considered, namely, the development of this by means of the various forms of encouragement afforded to the art trades.

Apart from schemes of a more expansive nature, which will be taken up later, there are several institutions devoted to stimulating specific industries, which may be first described. One of the most interesting of these is the Orissa Art Union at Cuttack which endeavours to place the trade of the silver filigree makers on a more sound commercial basis. In this it appears to have been successful, while the artistic side of the industry does not seem to have seriously deteriorated. At the same time some of the common productions of the workmen trading under this name might be discontinued and the indigenous designs, which are particularly beautiful, more generally adopted. This enterprise shows what can be done to encourage a deserving industry by local co-operation, but in any schemes of this kind special attention must be paid to one essential factor to success namely, the quality of the out-turn. The standard of the workmanship must be of the best while there should be no objectionable departure from the old traditional designs.

This particular trade of the silversmith is also receiving earnest consideration at the present time in another direction, as it forms the subject of the scheme of the Industrial Art Pattern Books which are now being prepared under Government authority. A staff of draftsmen, is employed in the Calcutta School of Art in copying the best designs of all the various types of silver work produced in Bengal and Assam. These will be published shortly and are intended to act as guides to workmen and others engaged in this particular field of art industry. With these as standard patterns it is

trusted that an important step has been taken to check any further serious deterioration of the art.

Of other efforts that are being made to revivify specific art trades mention may be made of the Kalimpong Mission where wood-carving in particular is being developed under the superintendence of the mission authorities. Influenced no doubt by this example the contiguous state of Sikkim, has opened a most interesting carpet school, which, although only in its infancy, shows signs of great promise. Scattered over the province are many other institutions which may be said to touch on the art trades of Bengal. Most of these however have a curriculum of a purely technical nature, an aspect of education which although particularly interesting is outside the limits of a paper which proposes to specialise in art trades alone.

Coming now to those institutions which generalize in their ideas of art encouragement, one to which the attention of members of the Conference is specially invited is "The Indian Society of Oriental Art." This particular association has been formed by a certain number of persons interested in Eastern art with the object of promoting a study of this subject in India. It is true, it has, up to the present, aimed primarily at developing the fine art of painting, but its exhibitions are nevertheless open to every form of oriental art industry, and not the least praise-worthy of its efforts is to give practical evidences of its purposes by assisting art workmen. To those who desire to further the artistic aspirations of any section of the community, their association with this society is strongly advised. Of the strictly educational institutions which are endeavouring to develop also on general lines the art trades of the Province, these are mainly confined to the various Schools of Art. Four of these are in existence, all situated in Calcutta, three of them being private institutions and one maintained by Government. It is not within the scope of this paper to detail the different lines on which these institutions work, but the results indicate that they turn out annually a number of trained youths whose influence on the art industries of the Province must be for their country's good.

The above is necessarily but a brief review of the art

situation in Bengal, but it is hoped that these few observations may be the means of interesting the public generally in the artistic trades of the country. It may not be out of place to repeat here what has been frequently remarked by those actively concerned with this feature of Indian life, that any genuine development of the æsthetic must come from the Indian people themselves. This is no doubt true of all healthy national growths, but doubly so with regard to that somewhat transcendental subject—Art. It seems appropriate that this should be borne in mind at a time when the more materialistic industries are receiving so much earnest and thoughtful attention.

INDIAN WOODS SUITABLE FOR MATCH MANUFACTURE.

BY R. S. TROUP, ESQ.,

Imperial Forest Service, Dehra-Dun.

The past development of the Match Industry in India, although it does not by any means show a record of universal success, forms an interesting page in the history of Indian Industries. Although match factories in India have been established at various times for several years past, many of them have proved failures owing to two main causes, (1) wrong choice of sites, and (2) lack of expert advice. There are now, however, at least half-a-dozen fair sized match factories which are working successfully, while several influential firms are at present considering the question of establishing new factories in suitable sites.

That there is room for great expansion in the match industry in India, is evident from the fact that the value of matches imported into the country has been increasing of late years by leaps and bounds, and in 1907-08 reached the large sum of nearly 74 lakhs of rupees. So great, indeed, is the total consumption of matches in India, that it is estimated that if India were to manufacture all the matches

she consumes, she would require at the present moment nearly 60 fairly large match factories in addition to those already existing, while within a few years, allowing for the probability of a trans-frontier land trade springing up, she would require at least 70 such factories.

To pursue the question a little further, it is estimated that if India were to manufacture all the matches she now imports, she would require annually for matches, match boxes, and packing cases, some 4 million cubic feet, or 80,000 tons, of timber in the round. As most match-woods are of the kinds known as "inferior" woods, which are often of little or no value for anything else, the benefit to the State and to the forests, through the cutting out and sale, even at very low rates, of this quantity of inferior timber, would be considerable.

Most of the existing Indian match factories have been equipped with machinery made by a well-known Berlin firm, the matches and match-box veneers being made by the "peeling" process; the wood is used in the green state in round billets usually 1 ft. 8 in. in length and $3\frac{1}{2}$ to 8 ft. (preferably 5 to 7 ft.) in girth. These factories ordinarily produce from 300 over 700 gross of filled boxes per diem. There is undoubtedly room for the employment in India of small portable machines on the Japanese plan, these being carried about from place to place in the vicinity of the forests. Japanese methods have recently been studied by more than one Indian gentleman, but hitherto these methods have not yet been subjected to any extensive trial in India.

As the question of the match industry in India has been dealt with somewhat fully in a recent publication,* to which reference is invited for details, we may now proceed to a brief consideration of the various woods suitable for

* Indian Forest Memoirs, Economic Products Series Vol. 1, No. II, the Prospects of the Match Industry in the Indian Empire, with particulars of proposed Match Factory Sites and Woods suitable for Match Manufacture, Calcutta, Superintendent of Government Printing, India, 1909.

match manufacture. Much time has of late been devoted to the subject at the Imperial Forest Research Institute, Dehra-Dun, and no fewer than 59 different Indian woods have been subjected to trial in the manufacture of match splints and boxes, some of these woods being sent to Berlin for trial and others being tested in India. Of these, 51 kinds were found to be suitable in varying degrees.

It would be impossible, within the brief limits of the present paper, to give anything like a complete list of woods suitable for match manufacture, or to furnish full descriptions of them; such information can be obtained in the publication referred to above. Unfortunately some excellent woods are too rare to be of any practical importance, while others are scattered in the Himalaya and other mountainous regions, whence they could be extracted only at prohibitive cost. The following woods, arranged in alphabetical order, comprise the most important of those which deserve attention :—

Ailanthus excelsa (*Maharukh*). Very good for matches, not for boxes, (Peninsula of India).

A. malabarica (*Dhup*, Kan.) Very good for matches; also suitable for boxes. (Western Ghats).

Anogeissus acuminata (*Yon*, Burm.) Fairly good for matches and boxes. (Common in Burma).

Anthocephalus Cadamba (*Kadam*.) An excellent wood. (Assam, Bengal, Burma, etc.)

Bombax insignis (*Didu*, Burm.) Superior to Simal; an excellent wood. (Burma, Chittagong, etc.)

B. malabaricum (Simal). Largely used in existing match factories and a good match wood.

Boswellia serrata (*Salai*). Largely used in existing match factories. Requires long boiling before use, as it contains resinous matter which prevents the wood burning well in damp weather. (Common in dry forests of India.)

Diospyros ehretioides (*Aukchinsa*, Burm.) Good for matches and inside boxes. (Common in Burma).

Duabanga sonneratioides (Bandorhulla, Beng.) An excellent wood. (Bengal, Assam, Burma).

Ehretia laevis (Chamror). A good wood, but not often obtainable in large enough dimensions.

Erythrina suberosa (Pangara). Fairly good. (Scattered throughout the greater part of India).

Excaecaria Agallocha (Gengwa). Fairly good. (Common in the Sunderbunds.)

Garuga pinnata, (Kharpat, kaikari). Fairly good for matches, but not for boxes. (Common in most localities).

Gmelina arborea (Gunhar). Very good, but usually too valuable.

Holoptelea integrifolia (Papri). Fairly good.

Hymenodictyon excelsum (Bhaultan, phaldū). An excellent wood. (Scattered in dry forests).

Kydia calycina, (Puka, barranga). A good wood, but not usually obtainable in sufficient size.

Lagerstræmia tomentosa (Leza, Burm.)—A good wood. (Common in Burma).

Odina Wodier (Kiamil, Jhingan). Suitable for matches but not so good for boxes. (Common throughout the greater part of India and Burma).

Picea Morinda (Himalayan spruce, Rai). Fairly good for matches and suitable for boxes. (Occurs in large quantities in the Himalaya, but the cost of extraction may prove too great).

Pinus excelsa (Blue pine, kail). Very good. (A Himalayan wood, generally too valuable for matches).

P. Khasya (Khasia pine). Good as far as tests have gone, but further trial is desirable. (Assam, Burma; at present too inaccessible in the latter Province).

Pinus longifolia (Chir pine)—Good for matches and boxes. (Common in the North-West outer Himalaya).

Populus ciliata (the Himalayan poplar, safeda). One of the best match-woods in India, but unfortunately too scattered to be of much practical importance).

P. cuphratica (Bahau). A very good match-wood. (Along rivers in the Punjab and Sind).

Salix telasperma (Bed). A good wood. (Along rivers in most parts of India and Burma).

Sarcocephalus cordatus (Mau lettanshe, Burm.) A very good wood. (Fairly common in Burma).

Spondias mangifera. (Ambara). Good for matches, but not for boxes (Common in most parts of India and Burma).

Stephegyne diversifolia (Binga, Burm.). A good wood. (Very common in Burma).

Trewia nudiflora (Tumri). An excellent wood. (Fairly common locally, in damp localities).

Vitex glabrata (Goda, Beng. ; Tauksha, Burm.). An excellent wood, (very common in Burma).

In addition to the above there are numerous other woods which have been tested and found suitable for match manufacture, but in view of their comparative scarcity, or the fact that they occur scattered or grow in localities which are not sufficiently accessible, we may omit mention of them here.

Certain woods have been tested recently and found to be either of small value or quite unsuitable for match manufacture. Among these may be mentioned the Himalayan silver fir, *Morinda*: excellent as the wood is for wood-pulp, it has been found to make only moderately good matches, and to be unsuitable for match-boxes.

The question of sites for match factories is a most important one, but is one which has not usually received sufficient attention in the past. It should be remembered that wood is a bulky article which cannot be conveyed any great distance by road or rail without increasing the cost of production to such an extent that all chance of profitable working may be rendered out of the question. For this reason match factory sites should usually be on or near a railway, navigable river, or other main line of communication, and should be situated

either near the forest or else on a floating stream, for it should be remembered that water transport is the cheapest of all methods of conveying timber, while for purposes of match manufacture the wood itself remains fresher and in better condition if kept in water than if kept for any length of time in a dry state.

Before concluding this paper, it would be well to refer to the important matter of foreign competition. Matches of very good quality are at present imported from abroad and sold throughout the Indian Empire at extremely low rates. If the match industry in India is to reach the importance which it should do, it is necessary that the qualities of matches manufactured should be of a high order; cheapness of production ought not to be a bar, considering the comparatively low rate of labour and the abundance and cheapness of suitable wood in some of the Provinces. In this connection competition between Indian manufacturers is quite uncalled-for at present. The press of foreign competition is far more acute than any internal competition can possibly be for many years to come; and yet there is unfortunately evidence of a certain amount of unreasonable jealousy among some Indian manufacturers, although their most advantageous course of action would be to combine where necessary in obtaining good expert advice and assistance with a view to improving the quality of their matches, for it is only by such means that there can be any fair prospect of overcoming the severe stress of foreign competition. Such a course of action is all the more advisable, in that internal competition at present is practically non-existent, whereas foreign competition is one of the most serious menaces to an Indian industry which is at present in its infancy, but which with proper development has every prospect of becoming a most important one.

SOME ASPECTS OF THE SUGAR INDUSTRY IN INDIA.

BY A. B. SHAKESPEAR, ESQ.,

Cawnpore.

To attempt any general review of the sugar industry in India within the limits of this paper would be manifestly an impossibility and I therefore have endeavoured only to suggest certain basic considerations connected with the industry, partly with the view of correcting misapprehensions likely to be created by the somewhat irresponsible statements which have appeared from time to time in the public press and elsewhere. This paper touches lightly upon:—

1. India's requirements in sugar.
2. How they are at present satisfied.
3. The refined sugar fallacy.
4. The possibility of replacing foreign with domestic refined sugar.
5. The difficulties, agricultural and manufacturing and transport surrounding the expansion of the sugar production of India.
6. The case for protecting the industry during development and closely connected with this subject the constitution of an association of Indian sugar producers.

It is important in the first place to understand what India's requirements in sugars really are. In round figures she consumes annually $4\frac{1}{2}$ million tons of raw and semi-refined sugars of sorts, which are produced internally, and 5,00,000 tons of refined sugars which are almost entirely imported from abroad, if we consider the grey Javas which are now being imported in such large quantities in the category of refined sugar.

Glowing pictures have been represented of the enormous economic gain which would result if India could, by the establishment of central factories and the manufacture of sugar direct from the cane, produce her $4\frac{1}{2}$

million tons of unrefined sugars as refined sugars. This is mere theorising, because, firstly, the agricultural conditions which prevail and must continue to prevail in this country, would render such an achievement on any general scale an impossibility and, secondly, even should such a quantity of refined sugar be produced, there are not the class of consumers in the country to absorb it in this form.

The great bulk of the sugar produced in India is consumed in the form of a low raw sugar for direct consumption, and is eminently suitable to the requirements of the people, being highly nutritious, cheap, and capable of being manufactured by primitive methods. These raw sugars are not bought or sold on their value as measured in commercial sugar, nor is their price governed by their refining value, and I think it is safe to assume that no foreign country can ever invade our domestic market in this direction. The real problem before us is, can India still continue to meet the demand for these raw and semi-refined sugars, at the same time, produce the 500,000 tons of white sugar which she has now to purchase in the markets of the world.

Assuming the yields which it is known can be worked to in this country, a production of 500,000 tons of white sugar would require a cane cultivation of about 470,000 acres. The total statistical area under cane may be taken to be $2\frac{1}{2}$ million acres, so that to make India self-supporting, she would either have to enlarge her cultivation by 19%, or increase field and manufacturing yields over the existing cultivation sufficiently to produce both her requirements of raw sugar and of white sugar. To any one who has studied the conditions under which cane is grown and raw sugar is manufactured in this country, it will be manifest that the margin for improvement is enormous, and it is my belief that this could be accomplished without alienating any land from other crops.

Of the causes which at present tend to retard any advance towards more effective methods of cultivation and

manufacture, there is the universal condition under which crops are raised in India, *i.e.*, the division of the cultivation into small holdings. With the exception of isolated tracts, the cane crop is raised in widely scattered patches, and this compels the farmer to crush his cane as near the field as possible. He does not do this from choice for like every agriculturist, he would prefer to dispose of his crop as soon as it is harvested, and recover its value then and there, but he cannot do this. He is at present forced to combine with his neighbours and hire a small bullock-power mill, crush the cane, and make it into a saleable product. Here we have the root of the whole trouble. He does not recover nearly all the juice present in the cane, and he dissipates a large quantity of crystallizable sugar in the subsequent manufacturing operations. This is absolute economic waste and the sum total of the losses incurred by these little individual operations goes to make up the enormous bill which India has to pay to foreign countries amounting to nearly 8 crores of rupees for sugar which, I believe, she might make for herself. We have only to contrast the foregoing with the conditions prevailing in the countries which are competing for our refined sugar trade to make it manifest that we must eventually fail in any contest based on production costs. On the one hand there are natural advantages in soils and climate, capital, skill and organised enterprise; on the other, the poverty of the cultivator, his want of knowledge and his conservatism aggravated by the conditions of cultivation and manufacture which at present prevail.

How can we grapple with this problem? It is obvious that any improvement must be gradual. We cannot hope to secure much greater concentration of the crop: to accomplish this contemplates a revolution in the agricultural methods of the people. We must, therefore, deal with the cane crop as at present sown. It is evident that in the first place a factory for the direct production of refined sugar must ensure to the man who grows the

drop as good a price as he gets at present from the conversion of his cane into raw sugar. This, there is no doubt, can be done. Any factory equipped with modern plant would be willing to give the cultivator a price for his cane equivalent to its market value in raw sugar, even allowing for the fact that the cultivator gets, when he sells his raw product for eating purposes, the price of sugar for the impurities which it contains. In tracts where the cultivation of cane is very much scattered, any idea of attempting to collect sufficient supplies to feed even a moderately sized factory may at once be abandoned. There the cultivator must continue to work up his cane into a low grade sugar, by means of a small plant, but there is a tremendous amount of room for improvement even in these individually small operations, and the spread of the co-operative movement in other directions should be taken advantage of to encourage groups of cultivators to adopt appliances and methods of greater efficiency.

In the more condensed tracts, sufficient supplies can undoubtedly be collected for factories treating 300—350 tons of cane per day, but to render this possible, mechanical transport is, in my opinion, essential, not only to cheapen transport costs, but to ensure cane reaching the factory in good condition. The resources at present available to the cultivator for bringing his cane to the factory are bullock carts, which is a slow and very costly method of transport and would never sustain a factory's requirements. A system of light tramways, following the main roads of the district, and radiating from the factory for distances corresponding to the capacity of the plant, is in my opinion necessary if a modern factory is to be effectively and economically served with cane supplies. As regards the improvement of field yields, the problem is, I think, bound up with the intricate questions of irrigation and manure supply. It is beyond question that with sufficient supplies of water and manure, crops of cane can be raised in India which will compete in quantity and

quality with those of almost any country in the world but to accomplish this, heavy manuring and abundant artificial water is required, in view of the short growing period which exists under natural conditions. In the matter of irrigation the resources of the cultivator in tracts which are not served by canals are limited by his supply of bullocks, and in short rainfall years, even this source of supply fails, and with other crops to be attended to, he cannot economically concentrate all his energies upon his cane fields. I think the question of raising subterranean water for distribution from central points would well repay further investigation. The cost of lifting water from deep strata has I believe been reduced in a notable degree during recent years. The manure problem is more difficult of solution. Cattle manure may be ignored as a fertilising agent, and the employment of concentrated manures, such as oil cake, is still practically unknown in the sugar growing tracts of Northern India. It is quite certain that no important improvement can be looked for in field yields unless the manure supply can be augmented, and it is for this reason that I attach such importance to the working up of oil seeds in India instead of exporting them to foreign countries. In fact, with such potentialities lying before her staple crops, it seems that India could well afford to go almost any length to retain her fertilizers in the country.

This conference has assembled at one of the most critical periods in the commercial history of the empire. Great Britain is at the present moment on the threshold of a political struggle, the key note of which is the trade policy of the Empire. Whatever the issue may be, India cannot remain unmoved, and it behoves those concerned in the many industries of India, and especially the sugar industry, to be prepared for the change should it come about, for on no industry in India would the initiation of a protective tariff have as far reaching effects. It seems to me of the utmost importance in these circumstances

that the industry in this country should take steps to coalesce and frame a definite policy for its guidance. Although in the aggregate we produce more sugar than any other country in the world, producers are at present so many scattered units, lacking cohesion, and in the majority of cases entirely inarticulate. The Cawnpore Sugar Works with which I have been connected for several years have recently set on foot a scheme for the constitution of an India Sugar League, and I am glad to say that so far the idea has been favourably received.

The first and principal need is an investigation by eminent authorities of the potentialities of sugar production in India on modern methods and this investigation must be conducted under practical working conditions. A mere *ipse dixit* that salvation is to be found in this or that system, is not sufficient to convince capital, much less Government, and we must be able to present to both undeniable proof that India can supply the consumer with the white sugar internally as cheaply as our competitors over sea. Once establish this fact, and a case is made out for protecting the domestic industry, temporarily at any rate by means of a moderate import duty in order to encourage capital to engage in its development. The determination of the people of the country to consume only home-made sugar is by no means universally sincere as evidenced by the readiness with which foreign sugar dressed up to resemble country made sugar is accepted by the public and unless we at the same time move forward systematically in the improvement and cheapening of our sugar, we cannot hope to secure a really sound foundation for the industry in this country.

BENGAL FISHERIES.**BY S. N. DAS., ESQ.,***Assistant to the Commissioner of Fisheries, Bengal, Calcutta.*

The fish supply of Bengal has been decreasing so much so that fish ordinarily were not within the reach of poor and middle classes owing to the increasing high price. The Government of Bengal had therefore under consideration the question of the real causes of this dreadful change and of the possibility of improving and developing the fisheries of Bengal. It was thought that perhaps no systematic efforts were made to conserve and develop the fisheries on modern and scientific lines in Bengal although she has her magnificent system of rivers, vast estuaries, land lakes and above all estuarine seaboard, the fish supply was falling off very fast while other countries such as the United States, the British Isles and Japan having less source of fish supply were replenished. Having the above facts in view, Government of Bengal decided to place the Honourable Mr. K. G. Gupta, Member of the Board of Revenue, on deputation in 1906, to enquire into, and report on the state of the fisheries, as to how the fisheries are naturally replenished, what measures were taken to stock fish in rivers, tanks or lakes, whether there were any close season for fishing certain kinds of fish and whether a wasteful destruction of breeding fish and fry occurred at certain season of the year &c : He was also asked to give the suggestions for taking measures to replenish the fish supply to prevent the wasteful destruction of breeding fish and fry. He completed his enquiries in Bengal and submitted his report embodying the result of two enquiries into the state of fisheries as worked at that time. He then proceeded to Europe and America to study the methods of working fisheries on scientific lines as carried on in those countries with a view to make his final recommendations for improving the fisheries of Bengal. He submitted his final report in January 1908 with his suggestions and recommendations for organizing

a Department to take up steps calculated to improve the fisheries and fish supply of Bengal.

The Hon'ble Mr. Gupta left India in 1908 to join his new appointment in the Council of the Secretary of State for India in England and made over charge to Mr. A. Ahmed, the first Commissioner of Fisheries whom Government selected as competent Officer to give effect to the recommendations and suggestions made by Mr. Gupta.

I propose to divide the works taken up by the Fishery Enquiry Office into 3 main heads, with respect to their importance so far as Bengal is concerned—namely (1) Freshwater Fisheries (2) Estuarine Fisheries (3) Deep sea fisheries.

Freshwater Fisheries.—The fish which reside in fresh water and find favour with the fish eating population are those of the Cyprinidæ * and Siluridæ † families. The latter thrive in muddy water and are known to breed in beels or vast lowlands of Bengal and in tanks also. The diminution in the supply of these fish is chiefly due to the scarcity of water during the dry season when the tanks in Bengal are more or less dried up and partially due to the low lands being gradually brought under cultivation. The defective supply may be remedied to a great extent by the re-excavation of the old tanks and excavation of new ones which are very great in number to sufficient depths. In former days the Zemindars and the richmen made it one of their chief duties to look after the supply of their villages. This, is an indirect way, afforded breeding and rearing place for this kind of fish and consequently the tank fish were never known to fall off as we find it now. The fall of the supply is not due to the consumption of the very young ones of the fish as they are well known to be tasteless and are only taken by patients when prescribed by country medical practitioners.

The former are appreciated the most. The chief

* Rahu, Katla, Mrigal etc.

† Tengra, Shighi, Magoor etc.

varieties of the family are Rahu, Katla and Mrigal. These fish although flourish in tanks have never been known to spawn in such confined waters. Sometimes in vast low lands fry and fingerlings of these fish are found but it is very doubtful whether the fish spawned in such waters. Probably eyed eggs of these fish are carried in these waters with the flood from the rivers where they are known to spawn and are reared there. It is well known that there is no physical connection between the male and female fish of this kind for breeding. At a particular season, in Bengal from May to July, the females even if left alone, will be full of roes and similarly the males full of milt or sperms. When the roes and the milt become mature, the females eject the eggs and the males sprinkle the milt or sperms over them and then the eggs are fertilised. The fish have the natural instinct to abide by this law if not prevented from doing so by some external cause. It is probable that if these fish are to be induced to breed in confined waters, the first thing to be done is to remove the other fish specially the predacious ones which feed on other live fish from the tanks otherwise these fish will interfere with the fertilisation of the eggs by constantly running after the parent fish. The parent fish are generally afraid of the predacious and will constantly move about being unable to stand against them. Having the above facts in view the fishery department made experiments in some stations with the parent fish put in tanks wherefrom the other fish were removed to induce the fish to spawn in confined water under the above condition. The experiment did not come out successful as although the eggs were discharged they were not fertilised, so it has been concluded that there must be other conditions which are necessary for the successful breeding of the Indian carp in confinement and these conditions will form the subject of future investigation.

A student was sent to Europe to study the principles and methods of breeding fish similar to the Indian carp.

He has come back and is making preparations for taking up the experiment on scientific methods as carried out in Europe. It is quite unnecessary to dilate on or discuss his scheme before the actual work is commenced and the results known.

In Bengal eyed eggs are caught in the Ganges and other rivers and are hatched and reared in tanks. So that by increasing the supply from tank we decrease the supply of rivers. But when we are successful, which we hope to be at no distant date, in breeding the fish in tanks, we shall have the supply for the tank independent of the eyed eggs from rivers so that the natural supply from the rivers will remain intact.

The second cause of the decrease in the supply is the indiscriminate consumption of the young of this fish which are not so tasteless as those of the fish described above (Siluridæ). Some sort of legislature is necessary to put a stop to it. As this will affect for the present the livelihood of the fisherman, it is being very carefully considered by the Government in consultation with the representatives of public bodies and Zamindars.

Attempts have been and are being made to popularise the objects of the Government amongst the Zamindars and the general public to start carpulture station for the artificial propagation of the fish on their own account with the co-operation of Government. At first the public were under the erroneous impression that the Government were taking up the enquiries into fisheries of Bengal with a view to impose some sort of tax on the fisherman and those possessing fisheries to add to the revenues of the country. The Commissioner of Fisheries has, by his tours all over the province even to the very interiors, succeeded in removing the wrong impression to a great extent and in securing their co-operation in carrying on the experiments for the artificial propagation of the fish. The General public now appear to take a keen interest in the working of the Department,

The eyed eggs were purchased from the spawn catchers and were hatched in suitable tanks in the town. The resulting fry and fingerlings had been supplied to very distant places, where they are not procurable, for the purpose of stocking tanks. The growth of the same is recorded and the water of the tanks thus stocked examined to ascertain the abundance or deficiency in the microscopic organism which form the natural food of the fish. In some cases artificial feeding was attempted where natural food had been deficient but up to present with indefinite results. The general appearance of the fish is very defective, the growth of the head being disproportionate to the body.

For the proper growth of the fish in tank, it should be remembered that a certain weight of fish can thrive well in a definite quantity of water. So that we can stock a tank with a large number of fry and fingerlings but as they grow to larger size some of them must be taken out and put in some other tank so as to keep the weight of all the fish in that tank almost the same at any time. This will ensure the proper growth of the fish provided their natural food for the fish is not in deficit.

There is another very highly appreciated fish which cannot be properly classed as freshwater fish. These are Hilsa (*Clupeailisha*). They are classed as anadromous, that is to say, they live in sea usually and come in freshwater or rivers simply to lay their eggs. They appear in rivers from middle of May to October in their forward journey and again in their return journey in the cold weather when they are known as "spent."

Attempts are being made for locating the spawning ground of this fish for the artificial propagation of the same. The mature eggs of the fish will as a matter of course be found in the spawning ground. When this is done the mature female and male fish will be stripped of their eggs and milt respectively and the eggs after incubation will be hatched in a special apparatus devised

for that purpose (Universal Macdonald jars). By this method all the eggs will be hatched and the river replenished with the artificially hatched fry of Hilsa, which would not otherwise be the case. The exact spawning ground has not yet been located but it has been approximately determined.

A student was deputed to America to study the artificial propagation of the Shad, which corresponds to the Hilsa of India, with the idea of taking up work of a similar nature here in Bengal with regard to Hilsa. He has recently come back and is now making investigations preparatory to starting hatcheries.

Had the eggs and milt of ripe, Rahu, Katla and Mrigal fish been capable of being stripped, artificial hatcheries would have been attempted for the propagation of these fish also but they being gelatinous cannot be stripped.

The fertilisation of the eggs of both the Hilsa and the Rahu is effected in the same way. Wherever the fish are found naturally in shoals or schools the spawning ground must be there or very near to it. A microscopic examination of the ovaries of the fish in places where the fish appear in schools will lead to the determination of the exact spawning ground.

A close study of the growth of the eggs and the condition of the ovary in different stages of growth is essentially necessary for determining the spawning ground. Now it would not be out of place to mention here that there remain eggs in the ovary for 3 years. To distinguish between the eggs of 3 years it is necessary to know the structure of the eggs and the growth of their different parts. The eggs consist of an external shell inside which there is vitallus or germ and a food supply for the growing fish, this being called the yolk. There is a very small aperture leading to the vitallus from outside through the shell which is called the micropyle. The spermatozoa of the male fish enters the shell through the micro-

pyle which is sufficiently wide for its admission in this year's eggs and thus impregnation is effected and the eggs are fertilized after which they increase in size. The yolk become denser and afford food to the fertilized germ till it is hatched out. When the eggs are taken out of the ovary and examined under a microscope the eggs for this year appear dark coloured as the yolks in them are more developed and do not consequently transmit light through them being practically opaque, while those for the next year appear transparent, the yolk in them being not developed as explained above. Similar is the case with the eggs for the year after next.

It is evident that by knowing the size of the eggs at two different places in the same river and the distance between the two places, the distance of the spawning ground could be approximately found if only the size of the mature eggs is known. It is necessary that the eggs at different places should be examined under the same conditions in which they remain in the ovary. For this purpose a standard solution of salt of the same density as that of the liquid in the ovary in which the eggs float and remain should be prepared and the eggs should be taken out and placed in that solution for examination under the microscope. If the eggs are placed in water for examination they would increase in size by absorption of water and if in spirit or alcohol they will undergo a decrease in size.

THE HAPLOCHILUS are three eyed fish—These are small fish and never grow to a size more than 3" in length. These are not considered as edible even by the lower classes of people. Their great importance and significance are that they have a peculiar and natural propensity for eating up the mosquito larvæ which are known to propagate malaria. These fish have been supplied to very distant places as far as Bombay to culture the fish there. They might also be introduced in the United Provinces and the Punjab with great advantage specially

where malaria is known to be very prevalent. Mr. B. L. Chaudhri, B.A., B. Sc., (Edin.) late Assistant to the Commissioner of Fisheries made certain investigations recording their habits and usefulness. He read a paper on this before the Asiatic Society. I quote below a portion from the same for the information of those that are present here. "It has been determined that these surface swimming tiny fish possess ravenous appetite for living and moving larvæ in water and that they go in for wriggling larvæ of mosquitoes with great avidity and clear up a bottle full in no time. With the true instinct of carnivora in general they do not touch dead or the quiescent ones and prefer starving in presence of dead larval bodies."

"Though essentially a fresh water fish they are found also in somewhat brackish area where they thrive on wriggling larvæ in their natural habitat. By careful training those from brackish water gradually take to fresh water but just in the beginning for a few days they appear dull and inactive. We are now trying to ascertain the numerical strength of this tiny fish necessary to keep a definite surface of stagnant or confined water sheet free from mosquito to do which rearing a large number of these fishes become necessary. Until this proportion is ascertained no definite proposal to utilize this fish as a factor in the checking of growth of mosquitoes is probable. Co-operation of careful observers also is very much needed.

The general principles on which the experiments were and are being carried out in Bengal, may be profitably and advantageously adopted in the United Provinces and the Punjab for the artificial propagation of the freshwater fish.

Estuarine Fisheries.—The yield of the vast tracts of the Sunderbans is proverbial. The Bhetki (Lates Calcarifer) which is the highly priced fish by Europeans especially, is abundant there. Two trips have been undertaken into these tract for finding out their possibilities and it has been conclusively found that the fisheries are very

rich. If they are properly worked and brought in fresh condition to Calcutta and other places, then the scarcity of the supply could be minimized and fish will be within the reach of even the poorest class of people. Nets brought from Europe such as drift and beam trawl nets had been tried and the efficiency of the country nets was watched in such water. From a careful study of the above two methods of catching it has been concluded that since European nets were designed for fish in English waters it is far better to adopt the Bengal nets in working out the Sunderbans fisheries than introducing the foreign nets but at the same time some such improvements should be made in the existing method of catching as are found necessary by experience.

Some devices are under the consideration of this Department for bringing the catch from these distant fishing grounds of Sunderbans in a really fresh condition to different centres of consumption. At present the native fishermen do not work beyond a certain distance for want of some means to bring the fish to places where there is a great demand for them. Consequently the best fishing grounds which are near the seaface and far distant from any place of habitation or shelter are still unworked. The best thing would be to employ country fishermen to fish those tracts and bring the fish in motor boats fitted with refrigerators. Moreover these motor boats can take provisions, water and other necessities to the tracts for the fishermen when going on their outward journey. It must be remembered that like other business or trade, the market should be commanded. For this purpose the number of such carrying boats should be large enough to bring sufficient fish daily for all the chief markets. It has been determined conclusively by experimental fishing in the more distant uninhabitable tracts of Sunderbans and those near the seaface that the fishing possibilities and the yields are more than the demand. Now if a Company be floated to work the fisheries in these tracts on the lines

sketched out above, it is bound to be very profitable with good business returns and at the same time the scarcity of the fish will be greatly removed.

Another source of the Estuarine fish supply is from the Bheri which is a low tract of land in the salt water area of the Sunderbans near Calcutta bounded on all sides by means of earth embankment sufficiently above highest water level. The stocking of these Bheris is carried on in an expensive method. The only contrivance required is the fixing up of a few wooden sluice gates in the embankment which open inwards and these admit water in the lowland at the time of high tide but do not allow the water to pour out during low tide, the gates being closed from inside automatically by the water pressure at the low tide. The eggs of the fish which abound in salt water of Sunderbans are thus admitted in the Bheri with the high water. They are hatched out there and the fry of the fish reared. The Bhетки the highly priced fish of Sunderbans and estuaries grow as big as 9" in 3 months. The worst feature of the Bhericulture as is done at present is that the fish are placed in the market before being allowed to grow to a bigger size when they would bring a comparatively higher return and moreover the expense of rearing the fish of a longer period is negligibly small. An experimental Bheri has been started by the Department near Calcutta at Bamanaghata where a statistical account of the growth of the various fish in the Bheri is kept. The object is to practically demonstrate that the Bheri would be more profitable if the fish are allowed to grow to bigger size before placing them in the market. It should be remembered as pointed in the case of fresh water fishculture, that when the fish grow in size, some of them must be removed for the healthy growth of the rest. Then it comes to the thing that also some revenue is derivable from the arrangement for helping the growth of the fish which does not entail any expense at all beyond catching the fish for market.

Deepsea Fishing.—Mr. Gupta in his final report suggested that the Bay of Bengal should be properly surveyed from the fishing point of view to locate the best fishing grounds during different seasons of the year. It is an established fact that all fish are migratory to a certain extent so that no particular kind of fish remains in the same part and depth of water throughout the year. A trawler named GOLDEN CROWN was bought in England and brought out fitted with all gears to explore the Bay for the purpose. A Fishery advisor was also brought out from England to identify the catches of the GOLDEN CROWN and advise the Government of Bengal on fishery matters in general. His services were placed under the Commissioner of Fisheries who had been the administrative head of the Department. It was never the intention of Bengal Government to carry on the commercial trawling in the Bay. The exploration of the fishing ground was essentially necessary to facilitate the future working of the Bay by private Companies. The survey of the Bay is a very responsible work and it involved considerable expense without any immediate return; so no private Company was expected to take it up and work it properly to the end. Moreover the public would not have any confidence in the result of such an important portion of the work arrived at by private Companies. Having the above circumstances in consideration Government undertook the scientific investigation to locate the best fishing grounds of the Bay. The result of the work of the Golden Crown had been published quarterly in the Calcutta Gazette. It is quite unnecessary to repeat this information here. She has surveyed both the east and west coasts, Charts have been prepared in the Commissioner's Office and published showing the places where different kinds of edible fish were captured at different times of the year. It has also been demonstrated that the fish caught in the Bay can be brought and placed in the markets of Calcutta, its suburbs and of more distant places such as Simla and Darjeeling in quite fresh

condition. The catch per day's fishing in the Bay is from 1.5 tons to 2 tons, a figure which compares very favourably with that in any other places.

The public had long been under the wrong impression that Government were running the trawler on commercial lines. They were right in so far that government have surveying the Bay with a view to ascertain whether commercial trawling was practicable. The work hitherto done by the GOLDEN CROWN goes to prove that the fishing possibilities of the Bay are extensive and that fish can be brought to the markets in quite fresh condition for human consumption. The GOLDEN CROWN had to stay out in the work as long as the coal and provision of the crew would permit and used to come in Calcutta twice in the month on an average. No business can be successful unless it can command the market daily. In the case of Government trawler it was not even known to the fish dealers when the trawler would be coming to port and with what quantity of fish. Consequently they could not depend on the trawler fish for their business. They considered it as a surplus quantity and would not care to take it unless their regular supply from other sources were deficient or they could get it at a nominal price; such being the case it would have been quite extravagant to look upon the fishing with one trawler which was worked for the exploitation of the best fishing grounds a commercial enterprise. Moreover it being a very responsible work as explained above highly paid European crew who were considered thoroughly reliable and competent to take up the work had to be entertained which no private concern would require henceforth. The catches of the GOLDEN CROWN which were brought to port and sold at a nominal price for the reasons already mentioned have created a taste of the seafish among the fish-eating population which is a great thing in advance for the future working of the Bay on commercial lines. The Indian population has a prejudice against taking seafish which has now been entirely

removed and the seafish now find favour with them to a large extent.

I may note that to run a commercial fishing concern in the Bay it is necessary that a fleet of at best 5 trawlers should work together and the catches brought to Calcutta daily in motor boats of small draft fitted with refrigerators from the seaface.

The trawler would not come inside the port. So the port dues which are prohibitive in Calcutta can be done away with. The provisions for the crew can be easily taken by the motor boats when running down from Calcutta to the seaface and the coal stocked at some suitable station on the seaface. When the business is established arrangements can be made with the Railway Companies to have sidings and refrigerator waggons.

It cannot be expected that all the hauls of trawler will consist of edible fish. The coarse fish or which do not find much favour with the fish eating public are bound to be caught also. Sometimes it so happens that the latter exceeds the former. If they are placed in the market they will not fetch a good price. It would be more profitable in that case to convert these coarse fish into manure. The livers can be submitted to some peculiar operations to extract oil. The sounds can be made into isinglass so it appears essential that a factory should be established to have the by products of fish in order to make a fishing concern commercially successful. It may also happen that the supply of fish is far greater than the demand. Such being the case, it is also desirable to have a curing yard established along with the trawling business so that instead of selling the fish at a very low prices, it would be more profitable to "save the life" of the surplus fish by salting, smoking, canning, and to keep them for bad season or export them to different places where there is a demand for such fish.

The offals of the fish, their heads and the fins &c.

which are separated before curing the fish, may be profitably converted into powdered manure.

On a small scale in an experimental measure a curing yard and a factory for the by-product of fish &c. had been started along with the trawling of the Bay in connection with the Department with a view to explain the various aspects and utility of the different branches of a commercial fishing concern. The local fishermen have had explained to them various methods of fish curing and encouraged to carry on the same in their own account whenever the supply would be found greater than the demand of the market and also for bad times.

The microscopic organisms which form the food of the seafish have been collected by plankton net and they are being analysed with the idea of ascertaining the richness of fish-food in the Bay.

The specimens of fish and curious hauled up by the trawler have been kept in the Indian Museum, Calcutta after identification as far as practicable within the short period. In fact this trawling of the Bay has given some new species which had hitherto been unknown to science.

It would be desirable to have the portion of the Arabic sea bordering the west coast of India trawled which may turn out most likely an efficient and extensive source of edible fish supply to the United Provinces and the Punjab.

In conclusion I have to thank the Railway Companies, East Indian Railway and North Western Railway, to permit us to bring up alive fish in safety and also the Committee for giving us the fine site for exhibiting the specimen collected.

We have also to acknowledge our grateful thanks to His Highness the Lieutenant-Governor of the Punjab and the Deputy Commissioner Mr. Butler for the patronage and assistance rendered to the section of our Department and for the keen interest displayed by the Punjabis in general and the people of Lahore in particular in watching the

exhibits and listening to the efforts made in Bengal to increase the food supply of Bengal and eventually of India.

It is hoped that the people now will take to cultivate fish in this land of 5 rivers and improve the material prosperity of the place by introducing the method followed in Bengal and Madras employing the waste land for the benefit for the cultivators as well as the well-to-do people.

INDUSTRIAL AND COMMERCIAL EDUCATION AS FACTORS IN NATIONAL AND INTER- NATIONAL PROGRESS

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Mr. President, and Friends,

The scope of this paper limits the treatment of the subject to a very practical consideration of the matter in hand and therefore no attempt will be made to draw fine distinctions or elaborate complex definitions of the terms used. In dealing with the subject, the broadest and most liberal interpretations will be accepted.

Commercial and Industrial Education, is that technical training, which on the one hand enables a man to comprehend the complex problems presented in the manipulation of the world's commerce and industry and on the other puts him in possession of the specialized training which not only explains the machinery by which it is carried on, but provides him with the skill necessary to alter or improve that machinery.

National progress is the measure of that virility in the people and institutions of a country which makes for their increased welfare and enables them to meet their needs.

International progress is the measure of a nation's influence in the councils of other nations, which is exercised by virtue of her national resources and strategical power.

With these simple definitions in mind, we will attempt to trace the vital connection that exists between Commercial and Industrial Education and national and international progress.

It is an axiom that no nation can rise higher than the average of its citizens. Citizenship is measured by the ability of the citizen to add to the State's fund of knowledge or physical well-being. The citizen, who is not producing something for the State is a dead weight that hinders its progress and drains its vitality. One of the fundamental problems, therefore, which confronts the State is, how to increase the number and efficiency of its "productive" citizens and how to keep as low as possible the number of the unproductive.

So long as the country has vast natural resources which can be readily converted into capital, as has been the case in the United States of America, the problem is not so distressing a one, but as the natural resources become exhausted, the problem becomes vital and the people must turn their attention to the intensive development and conservation of the available resources for their maintenance. It is when this stage is reached in the history of a nation's economic progress that the true value of efficient systems of Industrial and Commercial Education is realized. As an illustration of the importance of Industrial and Commercial Education, to a nation let us consider what has been accomplished by these agencies in the German Empire. The following extract from an essay on Industrial Education by Dr. H. S. Person, Ph. D. gives us the desired information.

"Present political Germany came into existence less than four decades ago, and although the establishment of the Empire marks the initiation of the present industrial policy, industrial Germany as we know it has developed mainly within the last two decades. Yet to-day Ger-

many is one of the strongest competitors for international trade in the world's markets, surpassing the United States in spite of her incomparable resources, surpassing France, in spite of that country's longer period of development, and having become a source of alarm to Great-Britain in spite of the latter's better developed resources and the advantage of two centuries of commercial supremacy. Germany has achieved so much in so brief a time, be it noted, not because of any extraordinary resources, nor merely because of her rapidly increasing population. Except in restricted areas, her climate is severe and her soils are poor. For the greater part of her raw material, she is dependent on other countries. Meagre, indeed, are her resources as compared with those of the United States. Quite other factors than these have made possible her development into so formidable an industrial state—factors that are social rather than physical. Two are worthy of special mention. One of these, is a quality acquired through centuries of intensive labour,—the capacity for taking pains. The struggle for existence caused by meagre resources has developed, in place of careless confidence, a consciousness of the necessity of thorough labour wherever and however applied. The second factor that has been at the basis of the development of present industrial Germany is the paternalistic state. The paternalism of the German Empire, applied to the creation of industrial efficiency, has secured wonderful results from the limited resources given by nature to the German people.

" Well established politically, Germany began to apply her centralized power to the development of industry. This expressed itself in many ways, in protective tariffs, bounties and subsidies, but in no way with more energy than in industrial education, which was pursued with the inherited characteristic of thoroughness, to which we have called attention. Students of industry became the advisers of the Government; the scientists in the laboratories of the Universities gave their services to agriculture and manufacturing; geographers and travellers studied with minuteness the physical characteristics of foreign countries; trade-schools were established for the development of skilled factory labour, and schools of commerce for the training of salesmen. Every resource, of a paternalistic government was brought to bear to create efficiency,—efficiency in producing and efficiency in selling.

The result has been the rise within a quarter of a century of that new Germany which has taken its place as one of the great states competing in the markets of the world. The creation of this powerful industrial state has been due, be it noted again, not to superior natural resources, but to deliberate effort in the face of relatively inferior resources. * * * *

What Germany, relies upon under these circumstances is the advantage of a highly developed system of Technical Education. She trains her chemists to the highest degree of efficiency, and, without any advantage in raw materials, takes the lead as a producer of chemicals

and as a consumer of chemical products in the scientific development of industrial processes, witness the Badische Anilin and Soda Fabrik, the greatest of aniline dye-manufacturers, and the Krupp Works at Essen, unexcelled in the manufacture of steel products. She trains her labour for the textile industry in trade-Schools, and rivals England and France in the manufacture of a grade of textiles which the United States cannot approach,—from raw cotton furnished by the United States. She trains her bank clerks in technical schools and banking institutions in the United States send for them to take positions at the head of foreign exchange departments. She trains her salesmen in these technical schools and they set out with a knowledge of the languages, customs, tastes, and peculiarities of their markets. * *

“ The same may be said of the Japanese. Their development has been not less remarkable, and it is to be attributed not less to technical education. For some years the Japanese have been sending young men abroad to secure training in the military, naval, and industrial arts. We have just witnessed the remarkable results of such training for war; the results of the similar training for industry are not forced by circumstances into so high a light, but they are not less significant.”

It is a significant fact that within recent years the nations which have been foremost in the commerce of the world have become keenly sensitive to the basic value of Industrial and Commercial Education, and it is not less significant that the British Government, has recognized the importance of technical education in connection with its administration of India.

Aside from the recent political reforms which are being inaugurated it is probable that no single action of the Indian Government is of so great importance to the well-being of the people of India as the approval in general of the extensive scheme of Technical Education drawn up by the Industrial Conference which was convened at Naini Tal during August 1907, by H.H. Sir John Hewett. Although the immediate benefits of this scheme will be felt chiefly in the United Provinces the ultimate results will affect the whole empire, not only in the tangible phases of its operations, but in establishing higher ideals in connection with the industrial development of India, in instilling new confidence in the minds of Indians that given the right conditions they are as capable as other peoples of producing high grade manufactures which will compete in the open markets

of the world and finally in raising the average intelligence of the artisan and inculcating the doctrine of the dignity of labour.

As illustrating in a concrete form the thesis of this paper, and also because of its great practical value to those interested in the industrial and commercial progress of India as well as from a natural pride that from our provinces has emanated so comprehensive and sagacious a scheme, I wish to outline the plan of Industrial and Commercial Education recommended by the Naini Tal Industrial Conference of 1907, accepted by the Government of the United Provinces supported by the Government of India and sanctioned by Lord Morley. This will probably be most successfully done by quoting the following excerpts from Lord Morley's letter to Lord Minto on the subject.

PUBLIC No. 110.

INDIA OFFICE, LONDON.

Dated the 30th July, 1909.

From His Majesty's Secretary of State for India.

To His Excellency the Right Honourable the Governor-General of India in Council.

My Lord,

I have given careful consideration in Council to your letter in the Finance Department, No. 361, dated the 24th December last with which you forward for my approval a large scheme, prepared by the Lieutenant-Governor, Sir John Hewett, for the development of Technical and Industrial Education in the United Provinces.

2. The scheme is calculated to cost not less than Rs. 16,44,500 initial and Rs. 469,820 per annum.....

3. I desire in the first place, to express my agreement with the language in which you have noticed the special position which Sir John Hewett occupies as a Lieutenant-Governor "quite exceptionally in touch with commercial opinion and with the industrial needs of his province." Any proposals emanating from him, and supported as these are, by the earnest and unanimous opinion of leading representatives of Indian Commerce in the United Provinces, must command respectful consideration.

4. The first and principal recommendation of the Lieutenant-Governor, on which the others may be said to hinge, is the creation of a

separate department under the control of an officer to be styled "Director of Industrial Enquiries and Education" to deal direct with Government, and the removal of this branch of instruction from the supervision of the Educational Department of the Province. The Naini Tal Industrial Conference of August 1907 considered that this officer "should have experience of the country and should, if possible, be an engineer with a knowledge of Chemistry and some acquaintance with industrial work." He would besides his general functions as adviser to the Local Government in technical matters and undertaking the inspection and supervision of industrial education generally, be the head of the Technological Institute which it is proposed to establish at Cawnpore, and which will at the outset be chiefly concerned with applied Chemistry and acid and alkali manufacture.

5. Next it is proposed that the technological institute under the Director should consist of two parts, the engineering work being concentrated at Rurki, the Thomason College being further developed in order to raise it to the level of research work, and the industrial work concentrated at Cawnpore.

10. The other branches of the scheme may be summarised as follows :—

	Initial Rs.	Recurring. Rs.
Two new Industrial Schools at Cawnpore and Gorakhpur	2,00,000	40,000
Extension of the Lucknow School	50,000	2,500
School of Design, Lucknow	1,45,000	30,940
Experimental weaving station, Benares	73,500	19,424
Chrome leather School and boot and shoe-making	45,000	12,528
Carpentry School at Bareilly	33,000	11,523
Button making at the Lucknow School (Rs. 250 a month for two years).	6,000	

In addition to these measures which had to be referred to the Secretary of State for sanction, there were several other recommendations of the Conference with which the Local Govt. has dealt directly, but which are of prime importance to the success of the scheme as a whole. These referred to the courses of study in the High Schools, and the establishment of courses in commerce in other institutions, and are as follows :—

19. The high school course should include, in addition to the present alternatives (Physics and Chemistry, agriculture and drawing) :—
Advanced Mathematics,
Physics and Mechanism,

Physiography,
Mensuration.

20. There should be a commercial course in the high schools in the following subjects :—

Book Keeping and Commercial Arithmetic.

Commercial Geography.

Pecis-writing, drafting, correspondence, and calligraphy, typewriting.

21. A higher commercial course, lasting two years, should be arranged for some group of the following subjects :—

Advance Accounting.

Modern business methods.

Commercial law.

Commercial history.

Commercial geography.

Precis-writing, drafting and correspondence.

Typewriting.

Shorthand.

22. Both courses should be terminated by an examination conducted by a board consisting of a representative of the Chamber of Commerce, representative of Government, and a representative of the College Staff. Certificates should be given to those students who satisfy the examiners. In both courses special attention should be paid to a practical knowledge of English.

23. A class for training commercial teachers should be attached to the Reid Christian College. And a higher commercial course should be started there and also, as funds permit, elsewhere.

The department for training commercial teachers was opened at Reid Christian College, 1st August, 1908 under the direction of a technically trained Professor obtained from America for this work.

The course in commerce has been introduced into the High Schools as a part of the School Leaving Course, and it is hoped that the Higher Commercial Course will soon be a reality

The scheme in its entirety, is indeed a bold and comprehensive one and one that must command the respect of all thoughtful men, who are in dead earnest about the industrial development of India.

It is not necessary for me to adduce arguments to show how such a system of Industrial and Commercial Education is a prime factor in the progress of a country.

Dr. Person in his essay on Industrial Education expresses these sentiments which seem to be of universal application. "Geniuses, it must be admitted, are born not made : no system of education can create them. But an efficient system of Industrial Education can accomplish three things : it can raise the general average of intelligence; it can develop specialized talent and it can offer the opportunity for genius to find itself. Acting as an instrument of selection, by presenting industrial facts in a way to make young men responsive, it can turn to industrial ends, abilities of all grades, the abilities of average men, of talented men, and of geniuses, abilities that might otherwise waste themselves in activities to which they are less adopted."

Surely, if Industrial & Commercial Education can accomplish these things—and who can deny that it has accomplished them, wherever it has been given a fair chance—it establishes its right to be considered as one of the foremost factors in national progress.

No nation is sufficient unto itself, however, and a civilization however strong if insulated from others will soon lose its virility. A nation cannot be said to be on a solid commercial basis, unless it is able to project itself beyond its own borders and compete in the open markets of the world. We, therefore, see that the internal development of the resources of a country are vitally connected with the international commercial relationships of that country, and speaking generally they are mutually dependent.

The true sphere of Commercial Education in its broadest sense is, therefore, realized when it is seen that it furnishes the training necessary to compete with the shrewdest and best trained men of every nationality in the markets of the world.

No nation expects to consume her entire output of manufactures, but produces largely for foreign trade. But of what account are the factories and mills if the art of

exploiting new markets and the knowledge of the most profitable methods of distribution and salesmanship are not reduced to a science, and systematically imparted to those who are to be responsible for the industrial and commercial credit of the nation ?

The demands made of the young man entering business to day are not those made of his father. The machinery of commerce is far more complex than ever before, the margins of profit are cut closer and closer each year, and the qualification desired above every other, in a successful business man to day is the ability to comprehend these intricate relationships and to adjust them so as to work to his advantage. Experience alone cannot supply this need : the man must come to his profession with a clear-cut knowledge of the principles underlying the problems of modern commerce and industry. To reduce this knowledge to a science and to impart it to the young men who are to be the future "Captains of Industry" of a nation is the special province of commercial training.

Whatever may have been the theories in vogue a decade ago, it is evident to day that industrial efficiency and commercial advantage depend almost entirely on efficient systems of technical education. The following extract from the introduction to Mr. S. H. Butler's note on Technical Education prepared for the Naini Tal Industrial Conference, forcibly sums up the situation :—

"The remarkable growth and expansion of technical education in the West and in Japan in recent years, marks at once changes in industrial conditions and changes in educational ideals ! The pressure of foreign competition makes increasing demands on the efficiency of labor; the apprenticeship system has broken down, and the increase in labor-saving appliances has made machinery more complicated and more dangerous. Great Britain, which had the start of the world industrially, lagged behind for many years in technical Education. Of late it has recovered lost ground * * * * Educational theories have bent before the new doctrines of national and individual efficiency. Special education now dominates and is transforming the general education on which it rests. The vocational, or utilitarian, value of subjects is fast becoming the measure of educational value. Not to perfect his

faculties on lines of natural growth, but to increase his technical aptitude is now the aim and end of education for the average man."

We have seen that national progress as measured by the material prosperity of a country is largely a question of—

1. the efficiency of the methods of production, not only from its own natural resources, but from imported raw materials, and

2. the mastery of the technique of salesmanship.

We have also seen from the experience of Germany and Japan that an efficient system of Industrial and Commercial Education is indispensable to the accomplishment of these results.

We have also seen how Germany's most valuable commercial asset is her system of Technical Education, and we know that as a result of this asset she occupies a place amongst the "World Powers," which it would be impossible for her to hold without it.

The fundamental laws of the Commercial and Industrial world are of universal application and what has been shown to be true in the case of one nation may be accomplished by any other by fulfilling the conditions required by those laws.

There are many indications that India is entering into a new and rich inheritance, but one of the most significant of all is the industrial and commercial awakening, which is being ushered in by such vast schemes of Technical Education as has been adopted by the Government of the United Provinces and which is being supported by intelligent and public spirited Indian gentlemen all over the Empire.

The Allahabad Exposition is in part an expression of the new interest that is being taken in this important phase of the country's development and is of epoch-making importance.

The very existence of this Industrial Conference is full of moment and it is hoped that it will not adjourn with-

out doing all in its power, by practical measures to attract the attention of the people to the true value of Industrial and Commercial Education as vital factors in national and international progress.

THE PRESENT ECONOMIC CONDITION OF INDIA.

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In the paper, which I read last year before the Madras Session of the Industrial Conference, entitled "Twenty-five years' Survey of Indian Industries", I attempted to form an estimate of the progress we have made during the last twenty-five years in the industrial field and tried to direct attention to certain industries, which await development. I propose, in this paper to take a rapid survey of the general economic situation in India at the present day, to determine what stage we have reached in economic growth and indicate the directions in which further effort has to be made. Last year I quoted facts and figures to show that from being merely a rural country with its vast population subsisting mainly on agriculture and the production of raw materials, India is slowly but surely taking to manufactures on modern lines. Various causes have contributed to bring about this welcome result. The rapid rise of Japan from a backward country like India to a position of eminence in commerce and industry, the comparative helplessness and poverty to which this country seemed to be reduced, and a close study of the industrial history of England, and especially of America and Germany, gave rise to a conviction in the mind of people here, that the salvation of this land lay entirely in its industrial regeneration and development. It was felt as an irony of fate that while other nations with a smaller population and with a scanty supply of raw materials, which

they had to import from outside, were dumping their manufactured goods on the Indian market, and thus growing fat on the gains made by commerce and industry, India, which at one time supplied the people of Europe with its far-famed shawls, carpets and cotton fabrics and exported large quantities of other articles of manufacture to foreign lands, should be reduced to the condition of a helpless customer for other people's goods. Memories of past prosperity and despair of the future combined to nerve men to a resolution to do something to reoccupy the ground which was fast slipping from under their feet. But in these times of mechanical inventions and scientific progress, it is easier to talk about industrial regeneration and development than actually to move an inch in the desired direction, especially in a country like ours, full of ignorance, conservatism and poverty. The conviction had, however, gained ground that the history of industrially advanced countries of the west might repeat itself here and that a sympathetic Government and a people awakened to a sense of their duty to themselves, might co-operate to place India on the path of speedy advancement. Though Government have been doing much latterly to assist the growth of indigenous industries it will not be ungenerous or unjust to say that they have not been able, owing to their peculiar situation, to do what other states have done for their people. The free trade policy of England, the old attitude of people there towards "plantations" and dependencies, still survives, and it is no wonder, if India is by many looked upon as a rich field for the exploitation of European capitalists and manufacturers. In determining the place of India in the British Empire, it is usual to put the commercial and the monetary advantage derived therefrom in the forefront. Though people in India have been roused to a sense of the grave economic situation of the country and are straining every flabby nerve of theirs to flog the dead and dying industries into life, they cannot be unaware of the stupendous task that lies before them. The whole

world around them armed with the most modern and scientific processes of manufacture, with enormous quantities of capital to finance industries, fortified with high protective tariffs, and ever ready and able to take the least advantage that may offer itself, is a giant competitor, with which this pigmy people with little capital, no scientific and technical knowledge and no protection for industries, has to wrestle, and one may imagine what the issue of the contest is likely to be. The situation is indeed so gloomy that one is tempted, through sheer despair, to give up everything for lost. A mighty economic revolution has been slowly working in the land doing havoc with the time-honoured old order of things. The very foundations are being undermined and their tenacity is giving way to new forces. There is underpinning going on here and there, and new foundations are being laid in places on which a new structure is to be reared. But for the time the old ruins distress the eye more glaringly than do the new works greet the sight. Like England and other countries, India has been a land of domestic industries, all of which have either crumbled to dust or are fast falling to pieces. The hand-loom weaving industry is almost gone-past recall, and the attempts to prop it up by means of improved crutches are not likely to be much of a success. The same dismal fate has overtaken other industries which at one time were so flourishing. Old industries, connected with sugar, paper, glass, silk, iron,—where are they? Almost all of them killed or in the process of being killed by foreign competition broad-based on modern appliances and up-to-date methods. Other nations, which have had a start over us, have occupied entrenched positions from which they look down complacently on us ineffectually toiling below. Latest methods and machinery, which modern science can devise, have long been in use there, and every day improvements are made therein which leave us still further in the back-ground. Hardly do we think of adopting a new process in manu-

lature, when we hear that in the go-ahead nations of the west, it has been already replaced by another still more economical and remunerative. We started paper-mills on modern lines and for the first few years we competed successfully with the foreign article. But soon wood pulp began to be utilised in the manufacture of paper in Western countries and our indigenous industry carried on on the old elementary primer formula, that paper is made of rags and straw, began to decline. The imports of paper and paste-board into India were valued at some $44\frac{1}{2}$ crores of rupees, the average of the 3 years, 1890-91 to 1892-93. They continuously declined during the next seven or eight years till in the triennium ending in 1898-99 the figure came to $36\frac{1}{2}$ lacs. This decline in the imports of foreign paper is explained by the successful competition of the indigenous paper mills. But from the years 1900 an upward tendency became visible, and the imports increased, till at last in 1907-08 they were valued at about one crore. From the year 1901 the Indian mills could not hold their ground against the foreign competition which was assisted by wood pulp. The history of the sugar industry has the same dismal tale to tell. We have got a few sugar factories and refineries and new ones on modern lines are also being started. But we are told that unless we adopt the central factory system, which has proved such a success in Mauritius and Formosa, our prospects must be anything but cheerful. The general impression that a study of the indigenous industries, old and new, leaves on one's mind is, to put it briefly, that it is an unequal fight in which we are engaged. But fight we must. The cessation of efforts would be suicidal. I am not a pessimist and hold that we are slowly but steadily progressing. But we have got to realise what is exactly the situation in which we are placed and what is the nature and extent of the obstacles we have to surmount. An easy-going optimism is not better than a despairing pessimism. The situation must be rightly understood be-

fore we essay to face the odds that are against us. And however gloomy the prospect, we must work with a singleness of purpose and a firm faith in our destiny.

The decay of old industries has thrown thousands of artisans and craftsmen out of work. Some new industries have been and are being started, but they cannot provide work to the unemployed. The period of an industrial revolution or transition is always a time of distress. People are swept off their old moorings and drift aimlessly along the hard times without support. No doubt, labour is in great demand just at present, and whatever of it is available in the various industries, is well paid. Prices have risen and along with them wages. It is a remarkable feature of the present economic situation that manual labour of every kind fetches very high wages and a common cooly or cook is better paid than a clerk. But domestic industries having disappeared, and the centres of industry having shifted, the lack-works accustomed to their old environments and attached to their old localities, do not easily migrate to places where labour is in great request. It is well-known that man is of all baggages, the most difficult to move, and it is not very easy for people to reconcile themselves to a change of environment and employment. When the period of transition is over, things will soon adjust themselves, but for the time being, there will be distress and hardship which can only be relieved by a further expansion of trade and industries. I have said above that the development of indigenous industries and the attainment of wealth and prosperity by their means, has become the settled ambition of the people of this country. But it may be asked, if the establishment of national industries is such a difficult job as already described, why waste efforts upon it? India is essentially an agricultural country, with three-fourths of its people living upon agriculture alone. Devote all your energies to its improvement; develop it to the highest degree attainable. Leave other countries which have

already occupied an impregnable position in manufacturing activities, to that business. They will require food, they will want raw materials, and must look up to you for the supply of the same. For instance, England must have cotton for her mills and wheat for her belly and must import them from outside. The very rumour that the supply of American wheat was inadequate and that it was being cornered by Mr. Patten made the heart of England flutter with anxiety and suspense. A similar rumour with regard to cotton sent a shiver into the manufacturing centres of that country, and short work was at once resolved upon in the cotton mills. India has thus a splendid opportunity of becoming an indispensable feeder of manufacturing countries and can occupy the same vantage ground in the production of food and raw materials as they occupy in manufactures. Those who have an intimate knowledge of the social and economic condition of the West tell us that even there, there is now a reaction against city life, full of hurry and bustle, smoke and squalour, wretchedness and poverty, which come in the train of the modern factory system, and that "Back to land" is the cry often heard at present in some of those countries. A warning is given to us and we are advised to think seriously before we plunge headlong into the life of manufacturing nations on modern lines. India has been, from time out of mind, a happy land of village communities and republics, leading the life of Arcadian simplicity, and its adoption of Western methods must bring upon it all the evils of industrialism, the overcrowded cities with their few millionaires and myriads of toiling work-people, the struggles between the employers and the employees, with their problems of unemployment, old age pensions, Poor Laws, Factory Legislation, and Socialism. Sir George Birdwood in one of his speeches asked the other day, "Is Europe going to make Asia an East End?" The gruesome picture often presented to us of European industrialism is such as to make us pause and

think. But we who know India, know that Arcadian simplicity and rural bliss are now things of the past among us to be found henceforth only in Utopias or the day dreams of the poet. Japan, a country of the Orient, has shaken off its old garb and put on a Western raiment. Even the sleepy Celestial Empire has been awakened from its slumber of ages and is going in for European civilisation. The countries of what is called the middle East are slowly preparing to follow. Can India be a solitary exception? Of course, not. Our lot has been thrown in with the greatest of the nations of the earth. Our contact with England, the peace she has given to this country and the other blessings she has brought us here have already changed the face of Indian society. Our hopes, our aspirations to take our proper rank among the nations of the world, have once for all fixed the lines of our march and there is no returning or lagging behind. We may, indeed try, if possible, to avoid the evils that have been disgracing industrialism in the West. But we cannot remain where we were or what we are. We must advance, we must imitate, we must assimilate.

Many friends of India taking a deep interest in the well-being of its people, hold that instead of frittering away their energies on the pursuit of manufactures, success in which is doubtful, and even if attained, would entail a heavy price, Indians should devote their energies to the development of agriculture, the premier industry of the land, which, on account of its supreme importance needs all the attention that can be paid to it. H. E. Sir George Clarke, the popular Governor of Bombay, seems to share this view. In a speech that His Excellency made at the time of opening the Agricultural Conference recently held in Poona,—a speech which furnishes much food for reflection to the Indian mind, he made a pointed reference to this subject. One of the points emphasised by His Excellency was that agriculture is and must remain by far the most important of all Indian indus-

tries and an essential basis of India's prosperity. The argument may be thus briefly summarised. India's increasing millions will have to be fed and a point may be reached when the growth of other staples will have to be checked unless the production of other necessities of life can be increased. European countries are becoming more and more dependent for their food supply. India not only feeds herself but derives a large share of income from the produce of land. It is supremely, important, therefore, that this position should be maintained. A sudden expansion of manufactures on a large scale would be disadvantageous. There is already a shortage of labour in certain localities and a further demand upon it would deplete the numbers required for the vital interests of agriculture. A rapid transference of country-dwellers to town-life would be an evil. The foreign demand for the produce of land must not be lost. Some of the important points contained in the above have been already dealt with. It remains to determine exactly what should be our attitude towards agriculture and manufactures. Here we have to bear in mind three important facts. A majority of Indian population subsists on agriculture. Nearly three-fourths of our exports consist of land produce. And Indian agriculture is in a most backward condition. The more advanced nations have come to apply up-to-date methods and scientific processes to all agricultural operations and the production of the fruits of the earth per acre is much larger in other countries than in India. The development of agriculture is therefore a very important direction in which we must make serious efforts, if not for the purpose of increased exports of food and raw materials, at least for the sake of meeting the growing demand for the same in the country itself. One of the causes that have been assigned for the high prices of food grains prevailing at present is that the production of these grains has not been keeping pace with the increasing demand for them. Again,

agricultural improvement is essential for the growth of the manufacturing industry. Let us take the sugar industry as an illustration. In spite of the frantic efforts latterly made to check the imports and consumption of foreign sugar by all available means, the country's sugar bill is every day going up by leaps and bounds. Last year, our imports of foreign sugar were valued at nearly eleven crores of rupees, which means an increase of 100 per cent. in less than ten years. Now one of the causes that hamper the indigenous sugar industry is the poor outturn of raw sugar per acre, which is more than three times as small as that elsewhere. To come in a line with Mauritius, Java and other places in this respect means agricultural improvement, the use of scientific processes in the cultivation of sugarcane, better manures and up-to-date methods all round. The textile industry is making a commendable progress, but we want cotton of a finer quality to be produced in the country and this also points to improvements in agriculture. Our tobacco industry is also handicapped by the poor quality of the stuff we produce. The same remark applies to other agricultural products and industries depending upon agriculture. Here then is a vast field for work. The greater the value we may coax mother earth into yielding to us, the better will it be for the poor cultivators and the country generally. The spread of primary education, the establishment of co-operative societies and agricultural banks, the diffusion of useful information regarding improved methods among the ignorant peasants, the supply of better manures and more extended irrigation works, are the directions in which effort has to be made, and we must congratulate Government on the particular attention that is being paid to this subject, and the special endeavours that are being made by the Agricultural Departments in the various provinces in this behalf. Educated people and Jamindars must co-operate with Government in this matter and not leave the poor and ignorant ryot to his own crude efforts.

Admitting then the supreme importance of the Agricultural industry and the infinite scope that there is for its development and the growth of the industries dependent thereon, one may ask, can we not attempt the pursuit of manufactures at the same time ? Shall we follow agriculture to the exclusion of other industries ? The idea of confining our attention exclusively or more prominently to agriculture militates against the present mood of the people and runs counter to their most cherished ambition. They aspire to make India a manufacturing country, not entirely so like England ; but it seems to be their determined attitude to attain a position of some importance in that line consistently with the maintenance of agriculture. There is no reason to suppose that this is an impracticable or unprofitable ideal. To-day there may be a shortage of labour in certain localities, the centres of manufacturing activity. But the vast and increasing population of the country may be relied upon for an adequate supply of labour for new industries that may be started, and we need not cripple agriculture by drawing off labourers working in it. The pressure of the population upon the soil is so great and the openings so few that with almost all the professions overcrowded and no scope in industry and commerce, agriculture and Government or private service are the only refuge of the unemployed. Far from agriculture requiring all the available labour, the Famine Commission has recorded its opinion that the poverty of the people and the risks to which they are exposed in seasons of scarcity are mainly accounted for by the fact that unfortunately agriculture forms almost the sole occupation of the mass of the population, and one of the remedies to meet this evil effectively must be the introduction of a diversity of occupation, through which the surplus population may be drawn from agricultural pursuits and led to find their means of subsistence in manufactures or some such employment. Inland and overland emigration have been proposed

as measures of relief to this congestion of population in agriculture, and thousands of Indian coolies have found their way to Mauritius, South Africa and other places, to work there on plantations and in mines as ordinary labourers and in some cases as carpenters, masons, gardeners and so forth. I need not here allude to the treatment that these Indian emigrants receive in their temporary foreign homes. My point in alluding to this subject is to show that there is an inexhaustible supply of labour in the country and if it is properly recruited and trained, it will be available to satisfy the demand of all the industries we may start or expand. In fact, from inquiries made in the United Provinces and Bengal regarding the supply of industrial labour, it has been discovered that there is no real deficiency in the amount of labour potentially available, and it is reported that no difficulty need be anticipated on that score. We shall also be indirectly relieving the pressure of population and guarding against poverty and distress if new industries provide work for people now solely dependent upon agriculture. As manufactures steadily advance, people will take kindly to the new system that is slowly coming into vogue.

It has been remarked with some amount of truth that the commerce of India in pre-British times was mere bagatelle in comparison with what has been developed in our own times. A glance at the figures of annual exports and imports is sufficient to prove this. The establishment of peace, the spread of railways, the post and the telegraph, which have linked together not only in the distant parts of the country but the various countries of the world to one another, have led to the development of an enormous international trade. Formerly the country was self-sufficient; it supplied almost all its wants and those of other countries also. Now it cannot remain isolated and self-satisfied. New tastes and habits have created a demand for many foreign articles and the decay of our old industries has forced us to look to other

countries for the supply of articles which were at one time our own proud monopoly. Though we need not and cannot hope to be self-reliant in the matter of every article among our imports, we may surely aspire to supply some of our main wants by indigenous manufactures by giving a new lease of life to old industries and starting new ones. Thus in the matter of cloth, sugar, paper, tobacco, oils, leather, matches, glass, silk, wool and other industries, large and small, we have infinite scope. Instead of sending all our raw materials to foreign countries to be manufactured there, and returned to us as finished articles, we may be able to manufacture our own goods and pocket all the profit that goes at present to other people. The success of the cotton industry and its ever-increasing prosperity are there to guide and cheer us, and though it may take us years and years to reach the goal, a beginning, however small, must be made in time. By manufacturing locally articles for which we enjoy special facilities, and exchanging them for such as we cannot make with advantage, we shall profit ourselves and contribute an economic gain to the world. We cannot any more allow ourselves to be charged with foolishly remaining idle while we have abundance of natural wealth under our feet and all around us.

But our difficulties? Well, they are many, and I have indicated some of them above. The first and the foremost is that about capital. In spite of the fabulous hoards, which are said to be lying idle and useless, it has to be admitted that there is no capital in this country, adequate to the financing of the larger industries on the starting of which the heart of people is set. The word 'poverty' is writ large on the face of the country and it is superfluous to prove what is patent. The new spirit of self-help and self-improvement that is abroad, and the general desire to promote the economic growth of the country, that is visible on all hands, are slowly inducing what little capital there may be to come out of strong boxes and run into

more useful channels. We learn from the latest report on Joint Stock Companies registered in India, that during the year 1907-08, 269 of these concerns were started with a nominal capital amounting to some 16 crores and that in that year there was a net increase of 139 in the number of companies with an increase of 13 crores in the nominal and of 6 crores in the paid-up capital of the same. At the close of 1907-08, the working companies had paid up capital of the amount of 50 crores, and increase of $6\frac{1}{2}$ crores over the year previous. During the last decade the increase in the paid up capital has been 45.9 per cent. These figures make it evident that Indian capital is slowly leaving its shyness and is being induced to come out in dribblets. The indigenous insurance companies, banking firms, glass works, sugar factories, cotton and oil mills, match, soap and cap factories and other manufacturing concerns that are being started in various parts of the country, point in the same direction. There is a steady improvement in the economic condition and the next generation will see an industrial progress which the last whole century could not bring about. But the figures of export and production values that are usually quoted to illustrate the industrial prosperity of India, do not reflect the true state of things. The growth of tea and coffee plantations, of coal and gold mines, of jute factories, of the kerosine oil industry and of industries concerned with minerals generally, which has been very remarkable during the last few years is no compliment to Indian capital, Indian talent or Indian enterprise. Excepting the cotton industry, which is mostly in the hands of Indians and is worked with Indian capital, almost all the so-called indigenous industries, which are taken to estimate the industrial development of India, are not indigenous in the real sense of the word. Most of these are worked with European capital and by European agency. The only profit that India makes from them is the wages which the labourers engaged in them get for their manual labour.

Take the tea industry for example. The total area under cultivation increased from 540,533 acres in 1907 to 548,127 acres in 1908 and the total number of plantations from 5811 to 5839. The total production of tea was some 247 million pounds, of which about 234 millions valued at 10·39 crores of rupees were exported ; which seems to be the highest figure on record. The industry employed more than five lacs of labourers, being an increase of 30 thousand over the previous year. The capital of the Joint Stock Companies engaged in the production of tea amounts to nearly Rs. 24 crores, *viz.*, companies registered in India Rs. 3·36 crores, companies registered in London Rs. 20·22 crores. Now here is an important industry carried on in India, employing five lakhs of men and with a capital of 24 crores, an industry bigger than even the cotton industry. But the most remarkable thing about it is that it is almost wholly controlled by Europeans and nearly 83 per cent. of its capital comes from companies registered in London. There were in 1907-08 some 50 jute mills in India employing 1,88,000 persons. The paid-up capital of 49 of these was £ 8,664,000. In 1908-09, the exports of raw jute were estimated at about 20 crores of rupees while jute manufactures were exported to the value of 15½ crores. The whole of this important industry is in the hands of non-Indians. The same remark applies to the out-put of Indian minerals, the total value of which raised during 1908 was returned as £ 7,823,745 against £ 7,079,708 in 1907, an increase of 10·5 per cent. In his Presidential address at the Madras Conference, Rao Bahadur Mudholkar adverted to this feature of India's industrial development and showed how the precious resources of the country are being exploited by outsiders, while we are getting only the wages for Indian labour employed to raise the minerals. Not one of the gold-mining companies is Indian, and the value of the gold produced last year was more than 3 crores. All the profit made in this industry, goes clean out of the

country. On account of their scientific knowledge, long experience and enormous capital, foreigners can easily take advantage of the many natural facilities, which India offers and the children of the soil have only to look at them with despair. The fault is partly ours inasmuch as we do not possess the necessary enterprise and knowledge, and cannot command the requisite capital. How can a backward people labouring under every disadvantage be expected all at once to be ready to compete with the fully equipped foreign exploiter? Of what earthly use is it to the Indians,—taking the word in its widest significance—if millions of pounds worth of minerals are annually extracted out of the soil and carried away without giving them any moral or material gain? We cannot certainly be expected to congratulate ourselves on the growth and prosperity of industries in which our only gain is wages of labour of the lowest kind. Such industries are *Swadeshi* by courtesy. The whole question is rather a ticklish one and Government is perhaps helpless in the matter. But so are people too and more so than Government. Rao Bahadur Mudholkar was handled rather roughly by certain critics for his unpalatable but true remarks on the point. As he said, this is not a question of race or creed; it is a question in which the most vital national interests are at stake, and as trustees of those interests, the Indian Government have a duty to perform by the people. The conservation of the natural resources of this country is the first duty of a paternal Government such as our British Rulers ought to show themselves. The Geological Department is making a survey of the whole country and publishing useful information as to the openings there are for capital and enterprise. But we are not in a position to profit by it. It is therefore necessary that larger numbers of Indian students must receive instruction in mining and metallurgy, licenses and mining leases must be altogether withheld from or more sparingly given to non-Indians, and

Indian enterprise and capital ought to be encouraged. Our motive in seeking industrial development is the desire to promote the growth of national wealth and national income. But much of our present economic development is development by proxy. We have a very small share in it and the profits of our industries do not remain to fructify in the pockets of the people.

British capital investments in this country are estimated by some at about 700 crores of rupees, distributed among various industries and other concerns. I am not one of those who would taboo all foreign capital. I would rather welcome it, provided, it is handled by our own people. It is said that the burden of the interest charges that India has to bear, is already very large, and we cannot afford to increase this burden by borrowing European capital any further. But if we ourselves borrow foreign capital for the exploitation of our national resources, the burden of the interest charged thereon will be more than counter-balanced by the profits that will find their way into our pockets and the increase of national wealth that will ensue. So long as no Indian capital is coming forth in the desired quantities, we must borrow cheap foreign capital. But the industries thus financed by foreign capital must be entirely in the hands of Indians. The enterprise and the management must be Indian, all the profits derived therefrom must also be Indian. Let us try by all means to get as much indigenous capital as possible. But large concerns—and concerns have to be on a large scale to be remunerative—require enormous capital, which we cannot hope to get locally for a long time to come. At present we put all European-managed industries whether coal or Gold mines, Woollen or jute mills, tea or coffee plantations, in the Swadeshi category, and this is good so far as it goes. But our next step must be to make them genuinely Swadeshi. Irrespective of creed or colour, they are the sons of India who have made this country their home, who have a stake in it and who share its poverty and

prosperity. To the wealth of these ought, our industrial growth to contribute. European talent, enterprise and capital have done and are doing the work of pioneers in many a difficult industrial and commercial line, and they are deservedly reaping the fruit of their exertions. We are much indebted to them for their having shown us the way and fired us with a zeal to follow their footsteps. We owe it to ourselves to acknowledge the service they have rendered to us, and our success depends upon how we profit by the lesson they have taught us.

There is an Indian proverb which says that the times are always what the sovereign makes them. This adage reflects the notorious dependence of orientals upon the State. India has been ever foreign to the democratic and representative institutions like those now predominant in the countries of the West. But what people are there on the earth who have not been helped into their commercial and industrial prosperity by the State? In Germany, America, Japan and even in England, the State has completely identified itself with the people in the promotion of industries. In England there was a re-action against too much State interference and in favour of *laissez faire* and individualism. But there is now a swing of the pendulum in the opposite direction, and a tendency towards State protection and State Socialism is clearly discernible almost in all the countries of the West. By means of bounties and draw-backs, protective tariffs and technical education, and in a hundred other ways the Governments of other countries are promoting the growth of national industries and national wealth. We, in India, expect our State to do the same thing for us. Our educated people are often taunted with their too much dependence on Government and their extreme fondness for Government service. Whether the taunt is merited or not, we have the examples of other States before us and we know what they are doing for their people. I do not wish to exag-

gerate, and it would be doing injustice to Government if I were not to acknowledge freely what the Indian State is actually doing to promote nascent industries. Evidences are not wanting to show that Government have become alive to their duties, and the economic development of the country is being assisted by them in various ways such as industrial conferences, exhibitions, experiments and demonstrations, surveys and scholarships and the introduction of better types of improvements and machines. What little has been done is nothing, however, in comparison with what has and ought to be done. The people though they have not done all that is expected of them, have risen to the occasion, and mutual response and co-operation may be calculated to do the needful in the near future. Government in India has, however, to devise its measures for the good of its people with one eye upon London and the other on Calcutta. And the two eyes do not often see things in the same light. It is a delicate task, to reconcile two often conflicting interests. But the firmness and liberality which have been just displayed in the matter of the Reforms may, with advantage, be extended to the sphere of industry. Public opinion in India has become uncompromisingly protectionist and expects Government too to accept that creed. India will be willing to join in the scheme of Tariff Reform which is to embrace the whole British Empire, provided she receives her due share of advantages. The Government of India is sure to stand by the people in this respect. Circumstanced, as we are, our purpose will not be served by mere palliatives and temporary measures. The State here must make it its serious business to see that Indian resources are developed in the interests of India and its people. It must give us all the facilities we want ; nay, much more. It must stimulate interest, spread broad-cast primary, technical and scientific education, send young men in their hundreds and thousands to foreign countries to learn various industries there, help capitalists

and enthusiastic men to start new industries and protect them against outside competition. For Indian people this is presumably not too much to expect of their Government. It has been done in Japan, in America, in Germany and in England. Why then not in India ?

In short, the situation is this. An economic revolution is in progress in the land. The old national industries are dead or dying. New ones have not yet taken their place. The competition around us is keen and killing. We lack, enterprise, capital, experience, scientific knowledge and sufficient State protection. Agriculture is in the most backward condition. There is congestion of labour in agriculture, which must be relieved by employment in manufactures. Poverty and ignorance stalk over the land. Conscious of their helplessness, and yet awakened to a sense of their duty, people are doing what they can to relieve the gloom that surrounds them. A ray of hope cheers their way and the Government is showing its interest in their efforts to revive old and start new industries. Most of the credit of the little progress that official reports and statistics show, belongs to European capital and enterprise. Most of what are called flourishing Indian industries with the growth of which India is usually credited, are in European hands, the fruit of their labour. The profits made from them naturally go out of the country and India is none the richer for them. People in India expect their Government to be national and do for them what other States have done and are doing for their own people. New India is Protectionist and wishes Government to adopt the same faith. The complete identification of the rulers and the ruled is the key-note of success. Single-handed, the people can do nothing. Nor have they done, it must be confessed, all that they should have. The little work that has been done only emphasises the vastness and the extreme difficulty of the whole problem. Some efforts are being made both by Government and people ; but infinitely

much more remains to be accomplished. The future depends upon how we help ourselves and induce Government to help us.

INDUSTRIAL DEVELOPMENT OF BARODA STATE.

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India, as we all know, is pre-eminently an agricultural country. But she cannot afford to be content with being merely agricultural. With cheap labour and the untapped resources of the land she ought to take her proper share in the manufacturing industries of the world. With the reduced productive power of labour in agriculture and the teeming millions of population at her command she is well fitted to organize and develop industries. But what is most urgently needed is Technical and Industrial Education. The different Provincial Governments of India have begun to move in the matter and we must all be grateful for what they are doing. I propose to give you a short account of what is being done for Technical Education and generally in the direction of industrial and commercial advancement of the people in the State of Baroda under the progressive administration of His Highness the Maharaja of Gaikwar.

Many of you probably know that the State of Baroda is divided into four distinct blocks separated from each other. The Navsari District lies near the mouth of the Tapti river and is interlaced with British and other territories. To the north of the river is the District of Baroda in which is situated the capital of the State. Further north is the District of Kadi with its towns and industries of historic antiquity. The District of Amreli lies in the peninsula of Kathiawar, and consists of tracts of land isolated from

each other. The area of the State is 8,099 square miles, and the population 19,59,692 according to the last census.

Since industry depends as much upon the working force available as upon any other factor it will not be out of place to give a few particulars in regard to population and its distribution in the Baroda State. As stated above the total population of the State is two millions in round numbers.

The total number of towns and villages is 3,447, of this number only one can be properly styled a city, while 46 are called towns and the rest villages.

But even the statement that there are 46 towns in the Baroda State is rather misleading. If we classify them according to population we find that out of the 46 towns, 28 contain population of more than 5,000 souls and 18 contain less. There is only one city, *viz.*, Baroda which can boast of a population over 1,00,000. There are only two towns with a population between 20,000 and 50,000, there are three between 15,000 and, 20,000, five between 10,000 and 15,000, eighteen between 5,000 and 10,000, and eighteen under 5,000.

Of the villages which number 3,400, 2,055 contain population of less than 500 souls, and 601 contain population between 500 and 1,000 souls. Thus we see that 86 per cent. of the villages of the State contain less than a 1,000 souls; 9.2 per cent. of the villages are under 2,000 and 4.8 per cent. are over 2,000.

Excluding the city of Baroda the rural population is four times the urban.

It may be interesting to note that 51.14 per cent. of the total population is engaged in pasture and agriculture, 4.1 per cent. in Government service, 4.98 in personal services, 14.2 are suppliers of materials, 3.5 are engaged in Commerce and storage, 2.86 in professions, and 2.87 are independent of occupation. There are as many as 13.34 per cent. classed as unskilled non-agricultural labour. These figures are taken from the last Census report.

It will thus be seen that Agriculture engages the largest percentage of the population and deserves primary attention.

His Highness the Maharaja Gaikwar has been taking interest in the development of agriculture almost since the time he assumed the reins of Government. In 1884, Mr. Khaserao Jadhao who is now the Collector of a District was, first sent to England for being trained up as a Specialist in Agriculture. This work of training up specialists in Europe has since been continued.

In 1889 when the University of Bombay instituted a diploma in agriculture, a provision was made for giving instruction in Agriculture in the Baroda College, and a farm was opened for purposes of experiments and demonstration. In 1898, however, the Agricultural classes in the College had to be closed for want of students, and then a scholarship was founded for Agricultural Education in the Poona College. A vernacular class in agriculture was also attached to the Farm. Among the students of this class were found some of the teachers of the vernacular schools who were trained as agricultural teachers in Village Schools. After a few years trial, however, even this school had to be closed as the facilities afforded were not appreciated and availed of by the people.

A State Agricultural Department has been established under a Director trained up in England to give assistance to the cultivators in all possible ways. The Baroda Model Farm is the principal farm in the State. A part of it is laid out for experimental work. Another part is set apart for practical instruction to students, and the rest is devoted to the production of good seed for distribution and sale. The ordinary Gujerath crops are grown from selected seeds. From the reports of experiments made elsewhere, the results suited to Gujerath are re-tested in view to their introduction if successful.

There is also a dairy attached to the Farm. It was started in view to introduce the European system of

dairy-work in Gujerath and to impart practical instruction to students. It has been so far successful that almost every large village has now a cream-separator, and cream and butter are exported to Bombay in large quantities. The industry has been so profitable that the one village of Nar annually exports cream worth two lakhs of rupees.

His Highness the Maharaja's paternal interest in his subjects can be well seen from the Dhanka schools for boys and girls at Songad. These are peculiar institutions, opened in view to give practical instruction in Agriculture to the most backward class of the population, *viz.*, the Kaliparaj into good agriculturists. The students are clothed and fed at Government expense. They get primary education in the vernacular and go through a graduated course of agricultural instruction. They are made to work on the Farm attached to the school. In view to introduce Sericulture as a Cottage Industry, Mulberry plantation has been prepared and practical Sericulture forms part of the curriculum.

The study of insect pests has not been neglected by the State. A special Officer trained up under Mr. H. Maxwell Zefroy the Entomologist to the Government of India is doing useful work in this direction. He educated the cultivators both by lectures and by practical demonstration in the methods of dealing with insect pests. He records his observations in regard to different crop-pests and conducts experiments as regards the utilization of useful insects. Information on the subject is also diffused by issuing leaflets.

It is a matter of common knowledge that agriculturists in India find considerable difficulty in obtaining good seeds and manures. To supply this desideratum a number of seed depots have been started by the State. The depots not only collect selected seeds locally but also obtain the best seed from outside through the State department of Agriculture.

After the first visit of His Highness the Maharaja to Mysore where Sericulture is a cottage industry, experiments

were started in Baroda in the year 1891. The State Director of Agriculture was deputed to Kashmir where the industry has advanced considerably, to study the methods followed there. The late Mr. N. G. Mukerji, the silk expert whose services were lent by the Bengal Government visited the different parts of the State and made valuable suggestions in regard to the further development of the industry. Under his advice arrangements have been made to extend Sericulture operations. The Baroda Government also deputed two men to Bangalore to learn the Japanese system of rearing silk-worms and reeling silk.

The Sericulture school at Songad has since been transferred to Vyara as recommended by the late Mr. Mukerji. The Mulberry plantations have now been extended and capacious rearing rooms constructed to enable large silk crops being taken. The demand for cuttings and plants can now be easily met.

The State has also made arrangements for rearing eri-worms. Eggs of eri-silk-worm were imported from Pusa, and crops are now being taken every year. Eri-silkculture is becoming more and more popular every year. It has spread even beyond the territorial limits of the State. The popularity of sericulture also is indicated by the fact that 48 boys from the higher castes and 39 from the lower received instruction in Sericulture during the year 1907-1908.

Arrangements have been made to make available to the people useful information on agricultural subjects by issuing a quarterly Agricultural Journal.

It will thus be seen that His Highness the Maharaja of Gaikwar's Government has been doing a great deal in the way of practical education in agricultural improvements. There are demonstration farms. There are seed depots for the distribution of selected seeds. Practical information in regard to new manures of proved value is diffused. Similarly cultivators are taught by practical

demonstration and otherwise how to deal with pests and blights. Dairying industries are spreading. Both eri-silk culture and seri-culture are being popularized by providing practical instruction and other necessary facilities. With all these efforts the progress in the adoption of modern methods by the cultivators is slow but is not disappointing.

This conference has been passing Resolutions from year to year in regard to the founding of Technical Schools and Colleges in the different Provinces. It is recognized on all hands that India needs at present a system of education which will train up men for industrial pursuits. You will therefore be interested to know what Baroda has been doing in this line. A Technical Institute called the Kala Bhavan—literally the House of Arts—was founded by His Highness the Maharaja in 1890. During the first year of its existence there were six courses of instruction provided there, each to extend over a period of three years. The courses included Drawing, Carpentry, Dyeing and Calico-printing, Agriculture, Pedagogy and Mechanical Engineering. The Institute was furnished with a library, a chemical laboratory, a physical laboratory and other appliances. Workshops were also fitted up for practical instruction in carpentry and mechanical engineering as also a dye-house. The subjects have of course undergone revision in subsequent years according to requirements.

To supply at least to some extent the long felt want of literary, scientific and technical books in Gujarathi and Marathi a sum of about Rs. 65,000, was spent by the State and a number of books prepared and published.

In 1897, a weaving class was added in view to introduce the fly-shuttle arrangement in the ordinary hand-loom used in India. A class in watch-making was similarly started in 1902. An evening school for Artisans was opened in 1906 to provide suitable instruction for artisans and craftsmen such as carpenters, joiners,

potters, smiths, wood-turners, and others who are engaged during the day in their own avocations and therefore do not get time to attend day-schools. The course of instruction provided comprises the three Rs and drawing. Arrangements have also been made to give instructions in the theory of carpentry. It is the intention of His Highness' Government to introduce other crafts as the demand for them may arise.

The popularity of the institute will clearly appear from the fact that the number of students rose from 192 in the year 1901 to 661 in 1908. Out of these 661 students as many as 178 belonged to other Native States in Gujerath and Kathiawar, 130 to the Bombay Presidency, 14 to the Central Provinces and 2 to the Punjab. The instruction imparted in this institute is so much appreciated by the people that in some of the most popular branches admissions have to be regulated by a competitive examination. Though as many as 169 offered themselves, only 43 could be taken up in the Mechanical Engineering Class.

The following table shows the number of pupils in the different branches of the Institute in 1907-08.

Branch.	Number of students.
Art	123
Architecture	94
Mechanical Technology	126
Chemical Technology	74
Weaving	61
Watch-making	12
Pedogogy	107
Commercial Training	7
School for Artisans	57

TOTAL ... 661

Such an institute cannot stand comparison with the Technological Institutes of Europe and America. But for a Native State in India with limited resources it certainly reflects credit on the administration,

Over and above the Technical Education provided in Baroda the State has hitherto sent at State expense a fairly large number of students to foreign countries for being trained up in various subjects, among them being the following :—agriculture, pedagogy, Civil Engineering, Electrical Engineering, mining and metalurgy, architecture, medicine, cabinet making, textile industries, watch-making and the science of commerce.

When we next turn to what Baroda has done and is doing in the way of developing trade and industries the establishment of the Bank of Baroda deserves first mention. One of the chief difficulties in the way of industrial progress is the problem of capital. India may not have large hoards as are sometimes referred to. But there is certainly an appreciable amount hoarded by individuals in small sums and remaining unproductive. Men of business find considerable difficulty in transferring funds from one place to another. In the absence of a Bank at Baroda the capital within the State naturally found a profitable outlet out-side, while the local industries remained languishing for want of capital. The utility of a bank needs no demonstration. We all see that Native Banks are rising up at different centres of trade in India. It is a common principle of economics that credit multiplies many times the commercial power of money in hand. Many of you probably know that the transactions of the Banks of England amount to sixteen times the actual cash in hand.

The bank as you all know stimulates the growth of industries by lending its own credit and capital to traders and manufacturers. Now, if instead of opening a bank in Baroda any of the out-side banks had been induced to open a branch at Baroda, the industries of Baroda would not have profited to the same extent. The branch would have served only as a feeder to the parent Bank outside and taken away capital for the benefit of industries outside the State. The educational value of such an enterprise to

the people of Baroda would also have been lost. The importance of a Bank at Baroda was brought to the notice of His Highness' Government and it was mainly through the initiative and perseverance of Mr. R. C. Whitenack whose services had been engaged for some time as Economic Adviser to the Baroda State that the Bank of Baroda was successfully floated. Valuable concessions have been granted to the Bank to insure its success. The Baroda Government has agreed to deposit with the Bank without interest an amount equal to one-fourth of the paid up capital not exceeding two and a half lakhs of rupees. It has also agreed to maintain deposits with the Bank equal in amount to three-fourths of the paid up capital, but not to exceed seven and a half lakhs of rupees in any case, at the rate of 4 per cent. per annum, if and when considered necessary by the Directors, provided that the Bank maintains at all times within the State assets equal to the amount so deposited. These concessions are to hold good for a period of 15 years. The Baroda Government has also agreed to pay to the Bank annually one-half of the salaries and expenses of management for a period of 5 years on condition that the Bank engages an expert Manager, and with the further proviso that the sum so paid shall not exceed Rs. 10,000 per annum. The State has similarly agreed to turn over to the Bank from time to time such proportion of the State's Banking business as the prosperity and condition of the Bank may warrant.

With such liberal concessions, as is natural to expect the Bank is doing good business and has proved a great boon to the people of Baroda. With the State at its back as it were the Bank commands the confidence of the community and is expected to extend its operations throughout the State.

While speaking of Banks a mention must be made of the State's activities in regard to the establishment of Agricultural Banks. There are two Agricultural Banks one at Songhad in the Navsari Division with a branch at Vyara,

and the other at Harij in the Kadi Division. These Banks were opened in 1899-1900 and 1900-1901 respectively in view to help the backward populations of the Talukas. Though Joint Stock in name they are practically financed and managed by the state. The banks make advances in cash and kind to *bona fide* cultivators. The advances are made for seed, bullocks, marriage and funeral expenses etc. Recoveries are made by the staff of the banks, but in special cases of obstructiveness on the part of the borrowers the Revenue Department of the State is authorized to assist the banks in making recoveries. This special provision obviates a recourse to the usually dilatory methods of the Civil Court. It is often urged that the provision in regard to the recovery of debts by the revenue process is likely to seriously affect the people's habits of punctual repayment of their debts. But the experience hitherto gained by the Baroda State does not justify any such apprehensions. It is only in exceptional cases that a recourse to Civil Courts is found necessary, and such cases are quite uncommon. The business of the banks has gone on increasing from year to year.

The deposits in the Songad Bank at the end of the year 1902 and 1903 amounted to Rs. 12,521 only, whereas at the end of 1908-09 they rose to Rs. 53,449. The advances in one year made to agriculturists similarly rose from Rs. 11,525 to Rs. 72,923. To start with, the bank was mainly financed by Government. But the popularity and credit of the bank have so far increased that the amount of capital subscribed by private persons now nearly equals the amount subscribed by Government. The net profits of the Songad Bank also increased from Rs. 618 to over 3,000 per annum. The Harij Bank also is doing good work though not to the same extent as the Songad Bank.

It will thus appear that the Agricultural Banks are proving more and more popular. They have been able to secure substantial deposits. The dividend on the shares subscribed by the State is restricted to a maximum of three

per cent. and that on private shares to 6 per cent. per annum, the excess of profits going to reserve and bonus.

The co-operative movement started in British India soon reached Baroda and in the year 1904-05 an Act on the lines of the British Indian Co-operative Credit Societies Act was passed by the Baroda Government and in the next following year the rules under the Act were published. Arrangements were made to explain to the people the advantages of co-operation. When the people saw how co-operation in this way could provide a cheap and easy credit, they came forward and 24 societies were organized in the very first year. Since then 33 societies have been formed and registered, thus bringing up the total to 57. But last year 5 of these had to be dissolved as they were not found working and no means could be found to work them. Such of the members of these societies as were better off did not care to develop them. The membership of the 52 existing societies is 974. This number is expected to increase as the movement becomes more popular.

Under the law of the State the members of Co-operative Credit Societies are not required to raise any Capital to enable them to borrow from Government as in British India. Up till now the Baroda Government has advanced Rs. 45,200 to the Co-operative Credit Societies. None of the societies have got any deposits from members or from non-members. They only receive a rupee from each member as entrance fee or annual fee. There is only one society in which shares have been subscribed by members.

One thing which is an absolute necessity in the case of Co-operative Credit Societies is efficient supervision. It is not safe to leave such societies to themselves without any adequate control and supervision. Supervision is particularly necessary because most of the members of rural societies are ignorant agriculturists, and their wiser but less honest brethren find it easy to take advantage of their ignorance. One such instance actually occurred last year, and it required a great deal of tact to mend matters.

It is necessary to note in this connection that under the Co-operative Credit Societies Act the societies are required to manage their own affairs according to fixed rules. With the existing backward condition of agriculturists it is hard to find men who can efficiently manage these societies. The progress in this direction must, therefore, be necessarily slow. It is a question for consideration whether a chain of local agricultural banks partly financed by Government and partly by local subscriptions, if properly managed, is not likely to render more efficient service to agriculturists in certain localities than Co-operative Credit Societies, on account of the backwardness of the ryot and his ignorance of formal methods of business.

As long ago as in 1893 a Geological Survey of the State was made by Mr. Foote. But the question of Economic Geology was not thoroughly investigated then with the result that the Baroda Government remained in ignorance as to the hidden resources of the State. A new Geological Survey was, therefore, conducted from an economic point of view by obtaining a loan of the services of an expert from the Mysore Government. The result of his investigations is awaited with much interest.

We have thus far seen that Baroda has done a great deal in developing agricultural and dairying industries. Agricultural Banks and Co-operative Credit Societies have been organized to supply the necessary capital. A Central Bank at Baroda has been started with liberal concessions from the State. This bank is calculated to be of great help in stimulating trade and industry. In fact the bank has accommodated a number of industrial concerns in Baroda territory.

A very important reform has been introduced by the Baroda Government in connection with customs duties. You all know that goods arriving at Bombay and other Indian ports from outside are charged duties prescribed by the British Indian tariff. These same goods used to be

subjected to fresh duties on the frontiers of Baroda and Kadi Districts of the State in view to obtain a Customs Revenue. The result was that while goods passed into British Indian villages after paying duty only once, goods coming to Baroda villages had to pay duty twice—once at the British Indian ports and again at the Baroda frontier. These arrangements were a real hardship to Baroda traders.

An important reform was therefore proposed by the Revenue Minister, the late Mr. R. C. Dutt and sanctioned by His Highness the Maharaja, in the levy of customs in September 1904. A large number of harassing duties on petty articles was abolished. All export duty was abolished except on cotton and Mahua. Import duties on the frontiers of the State were retained on a few articles only, and these were not subjected to any fresh duty on entering towns. In towns also the octroi duties were retained only on a few articles. This reform by the removal of harassing imposts gave a great stimulus to trade. During the current year a further reform has been introduced by the total abolition of customs duties throughout the State. The towns and villages of the Baroda State have now been placed on the same level as British Indian towns and villages. This reform has been introduced in view of stimulating trade and industries though at a considerable sacrifice of State revenue.

It is necessary to mention an important event in connection with the development of industries in the Baroda State. It was the creation of the Office of an Economic Adviser to the State and the appointment thereto of Mr. R. C. Whitenack an American gentleman whom His Highness the Maharaja brought with him from America. During his tenure of Office he showed great energy and perseverance in stimulating the industrial activities of the State. It was mainly through his exertions, and the co-operation of certain well known men of business from Bombay that the Bank of Baroda was successfully floated.

You may be interested to know that an economic and

industrial survey of the State has been ordered by His Highness the Maharaja Gaikwar. The inquiry will comprise various subjects such as agriculture, manufactures and industries, transportation facilities, the conditions of labour and capital etc. The work could not be taken up by Mr. Whitenack owing to other pressing matters, and he has now returned to America. It will, however, be soon taken up by the writer and it is hoped that valuable information will be collected. There is now a separate Department of Commerce and Industry for the investigation of special industrial subjects. The Department has opened a Commercial Intelligence Bureau to supply information to the public on commerce and industries, and it is gratifying to find that people have begun to seek information on industrial subjects.

When we come to the different industries of the State mention must be made of weaving, dyeing, metal-work, pottery and wood-engraving. Pottery is an industry for which Pattan is well-known. Wood-engraving of a high quality is done at Baroda, Pattan, Kadi, Visnagar, Vадnagar and Navsari. For brass and copper ware Dabhoi, Petlad, Kadi, Visnagar and Pattan are pretty well-known, silver articles made at Amreli are known for their fine polish. Similarly the weaving industry of Navsari, Gandevi, Dabhoi and Pattan is of ancient repute. But all these are carried on under old methods. In modern times when steam and electricity have superseded the antiquated forms of motive power in industrial nations and trade has become international, no industry can hold its own unless it adopts up-to-date methods. The State of Baroda has not been backward in encouraging modern business enterprise. As long ago as in 1883-84, His Highness the Maharaja established a cotton spinning and weaving mill at Baroda at a capital expenditure of Rs. 6,35,000 in view to encourage local manufacture and to foster private enterprise. The State worked the mill for 21 years and then sold it to private individuals. The successful working of the mill

in private hands led others to launch similar concerns. There are now three cotton mills successfully working in Baroda. One of the mills is at present only a spinning mill with 15,000 spindles, another has 200 looms and 11,216 spindles while the third has 365 looms and 17,632 spindles. All the mills are doing fairly good work though the year is not particularly favourable to the mill-industry. A fourth mill will shortly commence to work.

It must be noted here that the Baroda State has not paid less attention to the development of hand-loom industry. It has been the national industry of India since ancient times, and no effort should be spared to enable it if possible to compete successfully with the power-loom. In 1904-05 the State opened a weaving school where the Serampore, Ahmednagar and Japanese looms were tried. The first was not found quite satisfactory. The other two were better but too costly for the poor weavers. An effort was therefore made to construct a loom that would be cheap and at the same time would yield a large outturn. Such a loom was constructed and exhibited at the Benares Exhibition where it was greatly admired. A private company under the name of the "Sayaji Loom Works Limited" has been formed, and is supplying looms to different parts of India. It is intended to introduce the modern hand-looms in the different weaving centres of the State.

It may also be mentioned that another loom with a new contrivance has been invented in Baroda by Mr. Ramprasad Hiralal who has now organized a joint stock company of the name of 'Shri Indiraraja Weaving Company.' The loom can be worked by power as well as by hand, and can give a much larger outturn as compared to other looms. It is expected that the company will shortly commence to do prospering business.

It may be noted that there were during the year 1907-08, 6,641 hand-looms working in the State and that 10,682 persons were actually engaged in the industry,

As regards the dyeing industry it may be stated that the first Dyeing Factory on modern methods was established in Petlad more than fifteen years ago by Parekh Narayanlal Keshavlal. He suffered a loss in the beginning but by perseverance he has now made the factory paying. There are now five Dyeing Factories in the State worked on modern methods and using steam-power. The dyed yarn is in demand in many parts of India.

The Ginning Factories in the State which numbered 48 in the year 1902-03 have now gone up to 65, and the cotton presses from 4 to 9.

Billimora in the Navsari Division has two factories, one a rice-mill and the other a chocolate Factory. The latter has been started by Mr. Godbole who learned industries in England and Germany. The factory is worked by a Limited Company and the Baroda State has taken 70 shares of Rs. 100 each by way of encouragement. The factory turns out chocolate of a superior quality which has obtained awards at more exhibitions than one. But it is disappointing to find that sufficient capital is not forth-coming to make the factory a commercial success. In these days when people are talking so much of Swadeshi there should be no difficulty in finding capital for such a small concern.

The people of India have just begun to appreciate the importance of cotton-seed as a valuable oil-seed. One of the biggest items in the export trade of the State is cotton-seed. More than eight lakhs of rupees worth of cotton-seed was exported during the year 1906-07 from Navsari and Baroda Districts alone. A large quantity of seed was shipped to America for being tested. The subject was carefully studied and the information on the subject was printed in the form of a pamphlet. A Cotton-seed oil Mill has already started work in Baroda. Another is shortly expected to be started with the latest American Machinery. The Machinery has already arrived in Baroda. In all there are five oil-mills working in the State.

Raw hides and skins was another important item of export, which attracted the attention of the Baroda Government. An expert in tanning who received his training in America was employed by the State to develop the Chrome Tanning Industry. He visited tanning Factories at Bombay, Madras and Cawnpore. A Joint Stock Company with a capital of a lakh of rupees has now been floated to manufacture chrome-leather. The State has conferred valuable concessions to the company by way of encouragement, one of them being the loan of the services of the expert free of charge for one year. The company is expected to start work in a short time.

The Baroda Tramway Company is another instance of the encouragement which industries have been receiving from the progressive administration of His Highness the Maharaja Gaikwar. There are not many cities in India which can boast of a Tramway. The distances in Baroda from the city to the Railway Stations on the East and the West are considerable, in all about five miles. It was therefore, thought desirable to have a Tramway. Messrs. Karmally Brothers of Bombay and Baroda came forward with proposals and a charter was granted to them. It is now more than a year that the Tramway has been working, and it is needless to state that it has proved to be a convenience of great value.

It is necessary to mention that almost all the industrial concerns in the State have received State aid in some form or other. Some have been given loans. Others have received total or partial exemption from customs charges. Water is almost invariably supplied at concession rates. It is often said that capital is shy of Native States. But experience has proved that the above statement is not true of Baroda.

A consistent policy of encouragement to industries has generated an atmosphere of confidence, and development is progressing at a fairly satisfactory pace. During the last three years a number of Joint Stock Companies

have been registered with an aggregate capital exceeding 43 lakhs of rupees.

This, gentlemen, is a short account of what His Highness the Maharaja, Gaikwar has done and is doing to promote the industrial development of Baroda. I hope this will convince you that Baroda is taking its due share in the industrial advancement of the country.

TRUE PATRIOTISM AND REAL SWADESHI.

BY JOHN KENNY, ESQ.,

Director of Agriculture, Junagadh State.

If the members of the conference here present, do not quite agree with the suggestions I place before them and the arguments I put forward in their support I merely ask for a careful consideration of views that are not brought forward in a spirit of antagonism to the wishes of the people. I am not a Government servant nor English by nationality, so that prejudice in favour of the rulers can scarcely be a charge brought against me.

As long as human nature remains imperfect no Government can be faultless and it is the bounden duty of the leaders of the people to endeavour to remedy defects in law and its administration and those arising from any other cause. Whether, under present circumstances, the means adopted to attain this end are the best is, however, open to question. In cases of serious disease the medical man who attacks the symptoms instead of going to the root of the evil, certainly does not act in accordance with the dictates of true science and may be doing his patient a deal more harm than good. To lop off a branch here and another there may but cause a sickly bush to become a spreading tree. Following the tactics of the British Parliament a great many Indians endeavour to besmirch the authorities and their acts, forgetting that the populace at home know exactly how to weigh the statements of those in opposition. Seriously as they consider Government by their representatives, there is

also a lighter view taken by Englishmen of the 'game' of politics, and hence the utterances of the leaders of both parties are classed as those of the 'Ins' and 'Outs'. Everything is taken *cum grano salis* and if, on the one hand the liberals are said to be running the State down hill to the quagmire of Socialism without guide or brake, on the other hand, the conservatives are described as the fifth wheel of the coach, an obstacle to all chance of progress. In India however, this is not understood. The ignorant classes know little of politics of any sort and are led by the diatribes of many a well-intentioned man to believe that the British are tyrants and monsters of iniquity in some way or the other they do not quite comprehend. Economics is to them as intelligible as Chinese ; but the talk about the drain on the country (of which so many speak much, and so few understand anything) gives the mob an idea that the Government is actually robbing the country.

Improvements can and will be made where necessary and useful, but every true statesman moves by steady stages. I know no country under the sun that advanced so rapidly along the path of political liberty as India under the English, and it is certain that no other country would have treated a conquered country as England has treated India. At present the question to be carefully considered is : "can the country be considered ripe for the many rights and privileges now demanded?" If there were a public opinion representing the three hundred millions inhabiting this continent, there is nothing in reason that might be asked, which any Government on the face of the earth could long dare deny. And this leads me to the question of true patriotism, which in my opinion is inextricably combined with true Swadeshi. We hear so much now-a-days of the progress of Japan, forgetful that one little but very important fact is left out of calculation when India is asked to follow in Japan's footsteps. The noble warrior class practically annihilated themselves before an advance was or could be made. Have we any such example in India ? When we have, India will soon be a self governing colony. This is true patriotism—the forgetfulness of one's self for the benefit of one's country. When this is accomplished it will be time to cry the present

meaningless shibboleth of "Bande Mataram." If there are leaders of the people they are and must necessarily be a mere handful as the officers in a regiment. But whom are they leading and to what? This is the crucial question. Do they show the immense population of the country the way to competence, contentment and happiness? The legions of poor cultivators what do they care about Governors' Councils and how are they to be benefitted? Endeavour to make two blades of grass grow where one grew before and more will have been done for the political benefit of India than all the Congress meetings, Conferences and questions in the Legislative Councils could possibly effect in the next forty years. The material prosperity of the country must first be aimed at. India is almost entirely an Agricultural country and the foundation for political freedom can be laid deep only if the state of the peasant is improved. What is the use of talking politics to a man, who as many aver, seldom knows what it is to have a good square meal. The work before the leaders of India lies in the agricultural line if it is to show any lasting success. Thirty years is a very small span in the life of a nation. Yet within that time wonders were wrought in Europe amongst the peasant population. Their priests were their natural leaders and devoted themselves heart and soul to the amelioration of the lot of their poor parishioners. Can we not find people in India to devote their lives to a similar object, men who will endeavour to spread the three R's in every village and add a little more on the knowledge of manures and their value? The sowcar must be replaced by the Village Bank and the Village Bank must be prepared to supply the best and cheapest artificial fertilizers where natural manures are insufficient, as is the case in all parts of India. That the Raiyat will take advantage of cheap money and cheap supplies of manure is amply proved by the "Interim Report of the first crop year 1908-1909 of the Nira Canal Tugai Loans Scheme, Poona District." Money to the extent of Rs. 2,66,500 was advanced on crops at 9 per cent. interest and the recoveries for this first year were Rs. 2,25,689 and Rs. 18,395 as interests. Rs. 2,07,815 were advanced against the crops due for crushing between

October 1909 and June 1910. Added to the usual manuring with cattle manure and fertilizers purchased privately not less than Rs. 40,000 worth of fish, castor and safflower cake was purchased from the special officer by those who obtained the loans.

It is evident that the moment the Raiyat has the means he spends his money on manures confident that he will be repaid by the increase of the crops. Unfortunately in this report we have not many important points that belong, of course, only to the Agricultural view of the question and the most important one is the vast differences in the returns and their causes. We see that with the use of complete well-balanced fertilizers in 28 cases the net profit ranging from 300 to 600 per acre.

This shows what our Indian farmers can do if only the means are placed at their disposal and renders it easy to credit Tieman's words about Egypt : "The outlay in artificial fertilizers repays one at the end of two years' harvests by 300 per cent., which is not an optimistic calculation but one to be looked for and obtained in every case under normal conditions." What may we not expect from sugar alone were the Nira Canal Tugai Loans Scheme repeated in various Sugar-growing districts of India. In a few years instead of importing sugar into the country, India would have to be reckoned with as one of the principal exporters.

I shall, no doubt, be blamed for repeating myself over and over but I cannot impress too often and too clearly on the minds of those interested in the agriculture of the country and consequently its industries and its material and political prosperity that experiments have already shown an average profit of Rs. 105 per acre of paddy following the use of concentrated fertilizers costing Rs. 9-4, that a harvest of 1,500 lbs. per acre was changed to 2,400 lbs. grain by similar means and that unmanured plots of maize that produced 1560 lbs. grain and 1626 lbs. straw gave a return per acre of 3610 lbs. grain and 2,316 lb. straw.

Such increases can be brought about all over India if manuring were not restricted to wet crops. Millions upon millions of acres lie unmanured for years and each of them could, with complete well-balanced fertilizers, give us a deal

more than the bushel per acre that would pay all the taxes of India. When we see the little expenditure on Indian cotton lands compared with America we do not wonder at the small returns, which average about 68 lbs. per acre in the Bombay Presidency against 250 lbs. in America. The need of India is manure. There is an insufficiency of cattle manure, and artificial fertilizers must be introduced. But this wants money and money can be placed at the disposal of the Indian peasant only by means of Rural Banks. Will true patriots once wake up to what their country wants of them ?

Manufacturers will follow only when there are people who can pay for the better cane mills, corn grinders, plough pumps, dairy utensils, etc., and with the greater production of cotton per acre vastly greater numbers of spinning and weaving mills will dot the country.

Then will India be able to supply its own wants and till then it is useless to endeavour to boycott the necessarily better and cheaper goods produced in foreign countries. I have spoken plainly and bluntly in the hope that a few thoughtful men really anxious to serve their country will consider these subjects the stones that will form the foundation of perhaps a slow-rising but solid edifice equal to, if not surpassing; anything that Europe can boast.

GARDENING AND BOX-MAKING.

(A Plea for Nature Study and Manual Training).

BY C. S. RAGHUNATHA RAO, ESQ.,

Pusa, Bengal.

The title of this paper may, at first sight, appear somewhat enigmatical. One would naturally ask himself the question: What has gardening to do with box-making and what have both to do with the work of the Industrial Conference ? I hope to be able to make it abundantly clear that these two occupations express symbolically the two main types of a boy's education, the rustic and the urban

having this in common that they both aim at training the eyes to see, the hands to work and the imaginations to be cultivated. These are qualities which are most needed to be kept in view in any system of industrial education.

In a paper, remarkable alike for its originality and its broad outlook, contributed to a volume of essays entitled *Ideals of Science and Faith* published a few years ago, Professor Patrick Geddes approaches, through the standpoint of technical education, at a harmony in the apparently conflicting ideals pleaded by the man of science and the man of faith. The learned professor narrates an interesting personal anecdote.

Yesterday in town I met an old friend, who tells me his son is soon leaving school with classical honours, to win scholarships and glory in like manner at Oxbridge. There in due course he will become a don, and perhaps cultivate the muses with the best; at any rate he can always become an athlete or a literary lounge, or an examiner, or coach, or common-room gossip, with the larger mediocrity. Or the boy himself may have views; he can at any rate become a high mandarin, say in the education office or the Indian civil or colonial service.

"And how is your boy and what is he doing since he is not at School"? I am asked in turn. "He does some lessons at home; and he is learning to be a pretty fair gardener." "Ah! and will that be enough for him by and by?" "Oh, no, not quite!" said; "when I left him he was making a box." "Ah!" said my friend again, and dropped the conversation, evidently thinking nothing could be made of my surly and paradoxical impracticability.

There can be no denying the fact that the present system of education by books has raised the general intelligence of the community and conferred substantial benefits upon the people, but the great danger in this type of education is that it has a tendency to become too purely literary in its character. The result of this is the vast number of 'amusers, talkers and other foremost percentagers upon the passing order' of whom, says the professor, 'the world is beginning to show symptoms of being a little less tolerant.' What Professor Geddes, therefore, pleads for as a vital necessity to the boy who prepares to equip himself for the battle of life is *constructive* work of some kind—work 'which will give him the needed schooling in resourcefulness and common sense, which are surely not among the least important qualifications in the world.'

Does gardening give the rustic child this needed schooling? Yes, and to an extent that books can never dream of doing. The latter can load the memory of the pupils with facts, but they can never train the powers of observation and give the children an intelligent interest in the every-day facts of rural life. The training which a child receives by gardening leads to an appreciation of the dignity of labour, and of the beauty in nature, and eventually arouses in him a spirit of enquiry which is the foundation of all scientific progress and research. It will thus be seen that the education of the rural child has a large bearing on the progress of agriculture and the prosperity of the country.

Before proceeding further it seems necessary to disabuse ourselves of one or two popular misconceptions in regard to occupations which involve the use of tools. It is sometimes asserted that children who are trained in the use of a spade or a chisel follow in later life the pursuit of a mechanic or carpenter, and that the child's ideal will be no higher than mere bread-winning. That such a notion should be prevalent even among those who are entrusted with the education of children is an indication of the false conception they have of education, and of a want of appreciation of the psychological issues involved in it. The natural impulse of every healthy child is to *do* something, no matter what. Every child is endowed with the faculties of feeling, knowing and willing and psychologists tell us how difficult it is to separate them. "A child is one and indivisible" though for the sake of clearness we sometimes talk of the body, the emotions, the intellect and the will. Any system of education, worth the name, should therefore have in view the development of *all* the faculties. Such development, in the case of children, is best promoted by occupations which involve the use of tools.

In the first place, the boy who uses tools must necessarily use both his eyes and hands, and the value of this training in later life cannot be lightly estimated. Secondly, the tools employed call into play all the muscles of the body, including those of the leg, trunk and chest. Thirdly, the boy *enjoys* the work— this cannot be said of books, for few boys

ever think of taking a book unless compelled to do so, and on this account he is impelled by the interest of the work to develop the powers of thinking. And lastly, the occupation, involving as it does personal effort, develops the boy's will power. In short there is no other occupation in which a child can so well and simultaneously develop his physical, mental and moral powers. As regards the other objection that the ideal of the occupation is low, it need scarcely be pointed out that the financial consideration of the work does not at all enter the boy's head. The essential point as far as he is concerned is the 'artistic and social' pleasure which the work gives him. As Professor Geddes observes, it is only 'in adult life the pay comes alone.'

I remember reading not very long ago a biography of William Cobbett and was struck by the somewhat remarkable career of this great radical English reformer of the last century. It is a matter of common knowledge that his early education began with the scaring of birds and the weeding of wheat in his father's farm at Farnham. Till his twentieth year his time was passed in farm labour, but being a lad full of adventure he gave this up to seek an appointment in the Navy, and in this he was unsuccessful, perhaps fortunately so for his country. Into his subsequent career as an attorney's clerk, a private soldier, an ardent Tory, a radical reformer and a parliamentarian, it is needless to enter. What I wish to bring out in relief is the influence for good of his early occupation in the farm. In the preface to his "*A year's Residence in the United States of America*," published in 1818, a book which, by the way, is not as widely read as it deserves to be, we are told that for thirty-six out of fifty-two years of his life, he had been a soldier or a political writer spending the major portion of his time in garrisons and in great cities. How then does it come about that he was looked upon as a reliable instructor of his countrymen in that most ancient of industries, agriculture? Here is his answer:

"Early habits and affections seldom quit us while we have vigour of mind left. I was brought up under a father whose talk was chiefly about his garden and his fields, with regard to which he was famed for his skill and his exemplary neatness. From my very infancy from the age of six years, when I climbed up the side of a steep sand-rock, any

there scooped me out a plot four feet square to make me a garden and the soil for which I carried up in the bosom of my little blue smock-frock (or hunting-shirt) I have never lost one particle of my passion for these healthy and rational and heart cheering pursuits, in which every-day presents something new, in which the spirits are never suffered to flag, and in which industry, skill and care are sure to meet with their due reward. I have never for any eight months together, during my whole life, been without a garden. So sure are we to overcome difficulties where the heart and mind are bent on the thing to be obtained."

Equally strong testimony as to the value of gardening as an occupation is given by him in the advertisement to his *English Gardens*.

"No pursuit is so rational as this, as an amusement or relaxation and none so innocent and so useful. It naturally leads to early rising, to sober contemplation, and is conducive to health. Every young man should be a gardener, if possible, whatever else may be his pursuits."

It is presumably in recognition of the growing importance of these new ideals in education, ideals, which are slowly but surely finding their acceptance in the advanced countries of Europe and America, that the Government of India laid down in their famous Educational Despatch (No. 199-211, dated the 11th March, 1904) that 'the aim of the rural schools should be not to impart definite agricultural teaching, but to give to the children a preliminary training which will make them intelligent cultivators, will train them to be observers, thinkers, and experimenters in however humble a manner, and will protect them in their business transactions with the landlords to whom they pay rent and the grain dealers to whom they dispose of their crops.' Again in paragraph 41 of the same resolution dealing with the training of teachers of rural schools, the Government of India observe : "These (the courses of training) do not attempt the impossible task of reforming the agricultural practice of the peasantry by the agency of village school-masters imbued with a smattering of scientific theory. They serve the more limited and practical purpose of supplying the village schools with teachers whose stock-in-trade is not mere book-learning, and whose interests have been aroused in the study of rural things, so that they may be able to connect their teaching with the objects which are familiar to the children in the country schools."

That the principles underlying this policy are sound no

one can for a moment doubt. What is of the utmost importance is that instruction in rural schools should be conducted upon these principles in such a way that 'teachers may teach less, but learners learn more'. In other words, what is required of the pupils in rural districts is a maximum of outdoor work with a minimum of book work. The importance of this was emphasised by the Board of Agriculture in India in 1905, and in a subsequent memorandum submitted to the Government of India by Mr. F. G. Sly, then Officiating Inspector-General of Agriculture. His proposals were briefly:—

(1) that a closer connection should be established between the Education and Agricultural Departments in the control of rural education,

(2) that the Director of Agriculture should be a Member of the Text-book Committee appointed to revise the curriculum and text-books of rural schools,

(3) that the Provincial Directors of Agriculture should submit the revised text-books to the Imperial Department of Agriculture for advice before their final adoption.

These recommendations, with some slight modifications, were approved by the Government of India and in pursuance thereof efforts are now being made to train village schoolmasters in Provincial Training Colleges under the Educational Department and give them a special course of instruction on the farm attached to the College. It is hoped the training thus received will enable the teachers to instil in the minds of children in rural schools powers of clear observation and thinking. It is by such training based upon observations and experiments that children can be made to learn the elements of agriculture, the constituents of the soil, conditions of plant life, seed selection &c., and not by direct agricultural teaching, for it is an article of pedagogic faith that the best way to make a child like his work is to make him understand it. The whole case for Nature Study has been well summed up by Mr. Mollison, the present Inspector-General of Agriculture, in a couple of sentences: "It teaches children to observe closely and to reason accurately from the data gained by observation. It brings them face to face with real things and tends to give to their minds an intelligent bent towards cultivation, and later for the assimilation of useful scientific facts."

Nature study is thus one of the surest ways of preparing children for engaging successfully in occupations of rural life, and one of the methods by which this object is attained is by means of school gardens. "We do not think that agriculture as an art, that is to say practical farming, is a subject that properly belongs to elementary education. At present the study of what is called the theory of agriculture is compulsory for boys in all rural schools, and is highly encouraged by fees. But our enquiry has shown that this study consists, for the most part, in committing a text-book to memory ; and we have come to the conclusion that it has little educational or practical value. We recommend instead that the course of elementary science to be taught in rural schools should be so framed as to illustrate the more simple scientific principles that underlie the art and industry of agriculture. We also recommend the maintenance and extension of school gardens, as a means by which these scientific principles may be illustrated and made interesting to the pupils." These remarks of the Commissioners appointed to enquire and report on the educational system of the primary schools under the Board of National Education in Ireland (1897) apply *mutatis mutandis* to Indian conditions and may be commended to the notice of the educational authorities in this country.

Coming now to box-making, a great deal may be said. It is an occupation which every healthy town-bred child takes to by instinct. With the aid of a few simple tools, and with a trifle expenditure, every boy ought to be able to make some really useful articles of domestic use such as a shelf or book-case. The labour involved in the work is such as to develop all the faculties of the child, and the child who is able to make a neat book-shelf will have learnt, untaught, lessons of personal intelligence, ability and unselfishness. Box-making, then, is not as is generally supposed a mere branch of technical or industrial education. It is but one of a series of exercises which in modern times goes under the educational movement known as *sloyd*. (*Sloyd* is a Swedish word for 'dexterity'). The courses in this system are so arranged as to have educational results. The main advantages, formative and utilitarian, of the system have

been summed up by Dr. Larsson, one of its leading exponents thus :—

1. It arouses self-respect and instils respect for all honest labour.
2. It develops self-reliance, concentration and the power to make and execute a plan.
3. It develops habits of order, accuracy and neatness.
4. It develops the æsthetic sense, the power to judge rightly as to beauty of form and proportion.
5. It develops right feeling by stimulating the desire to be useful, and by its appeal to the affection through the cultivation of consideration for others.
6. It strengthens the will by offering such motives as will induce a boy to work hard, and steadily to overcome increasing, but carefully graded, difficulties.

This system of education, which during the last two decades has been making great strides in Europe and America, began in Sweden in the early seventies. "It was," we are told, "first of economical rather than educational significance, *i. e.*, it was a movement for home industries, which, it was soon seen, must begin in the school if it was to have any lasting effect. Sloyd schools were started in different neighbourhoods by private individuals, some of them close at hand in the lan or country of Alfsborg, where Count Spane, the Chief of the country, had formed a Sloyd Union. Struck by the new movement, Herr Abrahamson, in February 1872, opened a work-school for boys at Naas, and two years later a similar one for girls, with his nephew, Mr. Salmon, for Director. In 1874, Herr Salmon became Inspector of Sloyd schools for the middle district of Alfsborg lan, a post which he held for several years. To meet the demand for Sloyd teachers, Messrs. Abrahamson and Salmon, in 1874, opened a training department in connection with their school, this being the first attempt of the kind. The question now began to be looked upon from an educational rather than an economical point of view. One thing was already quite clear. The teacher only could make Sloyd education ally useful, and so he strove henceforth to make the Sloyd school and the Folk school one. From 1878, therefore, he began to take ordinary teachers from his own lan in 5 or 6

week holiday courses in Sloyd, while still continuing the work of the seminary on the same plan which he had begun four years before. But in 1882 came a thorough change. The twelve-month courses ceased, and the short courses were extended, first to all Sweden, and then to teachers from abroad. At the same time, too, all other forms of Sloyd were dropped in favor of the one that was found the one most useful educationally, *viz.*, Wood Sloyd. The concentration of attention upon this method led to its development for educational purposes* which it can scarcely be said to have attained elsewhere. And there can be no doubt, too, that it is this concentration which has been a powerful help in securing the introduction of Sloyd into the 1900 Elementary Schools in which it is now taught in Sweden." I hope you will excuse this somewhat lengthy quotation from 'The Theory of Educational Sloyd' published by George Philip and Son, London. I have thought it necessary to do so in the hope that those of you who may be interested in the system may know how it came to be started. Sloyd has been now introduced in Finland, Norway, Germany, Switzerland, Holland, Great Britain and Denmark, but it is only in the United States and Canada that it has taken a very firm hold.*

In the beginning of last year, through the kindness and courtesy of Mr. H. J. Bhabha, Inspector-General of Education in Mysore, (since retired), I had the privilege of witnessing a Sloyd class at work in the spacious rooms of the Seshadri Memorial Hall at Bangalore, and Dr. Gustaf Larsson, Principal of the Sloyd Training School at Boston, U. S. A. who was specially sent for on Mr. Bhabha's recommendation to introduce the system in the Mysore State very kindly took me round and explained how the various models were worked out. The class was composed not of boys but of grown-up men, mostly graduates in Arts picked from the Education Department of the State. The big hall was fitted

* Details regarding the progress of the movement will be found in an interesting Memorandum on Manual Training for boys in Primary Schools in Foreign countries by Mr. M.E. Sadler, Director of Special Enquiries and Reports to the Committee of Council of Education, England.

with some thirty benches of convenient height and size, and with a rack for the holding of tools. Each bench is provided with about a dozen wood-working tools, consisting of a rule, a Sloyd knife, a guage, a try square, a jack plane, a bench hook, a pencil compass, a chisel, a saw, a brush and hook, a marking tool and drawing kit. You will see in the illustration which I hold in my hand the back and front views of a Manual Training Bench. In addition to these tools, there was a supply of general tools in racks fixed to the wall. Each of the pupils had first to make drawings of the 'models' from measurements, and then to make the objects from the drawings. The exercises were progressive, the first model chosen being a simple and useful article like a paper cutter, a spoon or a wedge, involving the use of very few tools, and were selected in such a way as to really help the muscular development of the pupils. This second illustration shows some of the models worked out by the students. I was told that the course for the teachers extended to about 6 months with 6 hours' daily work, comprising of short lectures on the educational principles of Sloyd methods of work and teaching, reading standard educational works, making sketches, working drawings, practical bench work in wood, &c. The teachers trained by Dr. Larsson have thoroughly understood the principles of the system and are introducing it in the various schools in the State. The total cost incurred by the Mysore Government for initiating the system into the State is, I believe, about Rs. 50,000.

What strikes one as particularly noteworthy in this system, is the training which it gives to the eye and to the hand. If the model the pupil aims at making is to be a perfect one, he has to see first that his drawing is correct and gives the proper dimensions. The only assistance given by the teacher—and that in the earlier stages—is the drawing of the model upon the blackboard to enable the pupils to have a clear mental picture of the object. The drawing is then erased and the pupil is left to himself to do the rest. It is thus absolutely impossible for any Sloyd pupil to commit a sophistry or to think carelessly. In other words, Sloyd is a 'training in accuracy, in ability to control self and

environment, in expression of thought, in deeds and in substances rather in language.'

Some of you who were present at Calcutta Conference three years ago will remember the eloquent words with which that most enlightened of our Indian Princes, His Highness the Maharaja Gaekwar, emphasised the need of introducing manual training in our ordinary schools throughout India. Said His Highness :

" My second suggestion to you is that, besides establishing technical Schools, you should endeavour to introduce some manual training in the ordinary schools. The training of the eye and of the hand at an early age is useful to all, even to those who have not to support themselves by manual industry in life. Easy lessons in drawing and modelling, simple instructions in carpentry and smith's work, are good for all students in all ranks of life. Physicians and psychologists tell us that such exercises, by introducing a variety in the course of studies, really refresh and help the brain and make boys and girls more capable of acquiring both learning and arts. And, moreover, to attach some industrial classes to our ordinary schools would have the healthy effect of giving a complete and not one-sided education to our children. The richer classes would be brought more in touch with the humble industries ; the poorer classes would acquire that skill and facility in handling tools which can be only acquired at an early age; all people in all branches of life would be impressed with the dignity of manual labour more than they do now in India, and your great endeavour to promote the industries of the land would be greatly helped when the nation receives an elementary technical training in schools."

In spite of these assurances from those who have seen the system worked in foreign countries, there is a widespread notion among our countrymen that manual training, if introduced in our ordinary school, will interfere with the *literary* education of boys. That such is not the case has been strikingly illustrated by an example which Sir Harry Reichel, head of the North Wales University College, furnished in the address on Manual Training Schools which he delivered not very long ago. He recalled the fact that some few years back a remarkable experiment was made in the school at Chetham Hospital. Mr. (now Sir William) Mather had visited the United States and had been very much impressed by the manual training given in some of the schools. On his return he proposed to include it in the curriculum of Chetham school, of which he was a Governor, but was met with a great

deal of opposition from his colleagues, on the plea that it would add unduly to the School time table and that it would interfere with the literary education of the boys. Sir William Mather would not, however, be daunted by the opposition and proposed to build at his own cost workshops for the school, so that the system could be given a trial for a year. He suggested that half the pupils should spend three hours a week for manual training—these hours being taken out of the time devoted to literary subjects by the rest. If at the end of the year, it was found that the workshop boys were inferior to the rest in literary subjects, he offered to remove the workshops at his own cost. The offer was accepted and the result at the end of the year was a pleasant surprise to Sir William's colleagues no less than to Sir William himself. Not only had the boys who had gone through the workshops not fallen behind the others in book subjects, but they were markedly in advance in certain subjects notably in Mathematics and Geometry. This convinced the Governor of the value of manual training and from that day it has taken a prominent place in the curriculum of the Chetham School. A further testimony, if needed, may be found in the Report of the Royal Commission referred to previously. In making their recommendations the Commissioners observe :—

“We may at once express our strong conviction that manual and practical instruction ought to be introduced, as far as possible into all schools where it does not at present exist, and that in those schools where it does exist, it ought to be largely developed and extended. We are satisfied that such a change will not involve any detriment to the literary education of the pupils while it will contribute largely to develop their faculties, to quicken their intelligence and to fit them better for their work in life.”

Enough, I think, has been said of the importance of the two types of education pleaded for in this paper. The educative principles underlying them are thoroughly sound and have stood the test of experience. They are general and not confined to any geographical limits, and if, as I believe possible, efforts are put forth to spread them

among parents and teachers, a great deal will have been done for the improved physical, mental and moral training of our children and for the industrial regeneration of our country.

SOME REFLECTIONS ON CO-OPERATIVE CREDIT.

BY PROFESSOR JOGINDRANATH SAMADDAR,
F.R.E.S., F.R. HIST. S.

*Of The St. Columbia's College, Dublin University Mission,
Hazaribagh.*

Nearly three long years ago an eminent country man of ours holding an unique position in the estimation of the people as well as of our Government in writing to me about the progress of the Co-operative Credit Movement in Bengal, intimated that the movement would not be of much productive result. I make no apology in quoting his words "It is very questionable whether the institution will take root in Bengal. The Act about Co-operative Societies was passed in 1904 but few persons have availed themselves of its provisions. In England, the institution was advocated more than 40 years ago but I find that during all these years there have been no more than 10 Agricultural Banks in England and about 30 in Ireland." He then went on to say that he would not be surprised if I did not change my opinion after I had got larger experience.

Passing reference to the progress in Ireland. A reference to the report of the Irish Agricultural Organisation Society will show that the progress there is undoubtedly a marked one. We give below a table which I cull from the report for the year ending 30th June 1908, which shows the number of societies of each class at the commencement and end of the year respectively but between 1st January and 6th June, 1908, the following new

societies were formed :—Creameries 11 ; Agricultural 6 ; Credit 9 ; and Miscellaneous 2 ; total 28. This brought the total number of societies at the end of the I. A. O. S. historical year to 941.

Description of Society	Total	Total
	31-12-06.	31-12-07.
Creameries	282	288
„ (Branches)	57	57
Agricultural	159	168
Credit	246	261
Poultry	29	32
Flax	9	15
Industries	51	49
Bee-keepers'	18	18
Miscellaneous	18	20
Federations	5	5

Totals : 874 913

Add to this the 28 Societies
started between 1st January and 6th June, 1908.

28

941

That is nine hundred and forty-one and all these are based and guided on the Co-operative principle. In fact, although the Irish are far ahead of the Englishmen in the adoption of Co-operative principles in agricultural production yet the number in England has greatly increased and the total amounts to now nearly 200. The turn-over last year was more than half-a million pounds and the number of societies is growing day by day.

Exactly is this the case in India. It would be no exaggeration now to say that not only has the movement been safely planted here but it has got acclimatized and has come to stay. Very few would deny that and as for me and changing my opinion, I have become a confirmed optimist. Facts given below will substantiate my statement.

Progress in
India year
before and
last years.

The number of societies of all kinds had risen from 1357 to 2008, and the number of members from 149,160 to 184,897. The working capital of the society aggregated nearly 81 lakhs of rupees against just over only 44 lakhs last year while the expenditure which includes loans to members and payments of deposits had increased from less than 47 lakhs to more than 84 lakhs. It is also very satisfactory to note that whereas state aid accounted for only Rs. 6,86,143 of the working capital or very little more than last year (Rs. 6,51,816) loans from private persons totalled nearly 25 lakhs of rupees against less than 12½ lakhs at the end of June 1908, a fact which shows the interest which people are taking in the movement. Comments are superfluous to make clear and unmistakeable the fact that co-operation has developed to a really remarkable extent in the few years since its introduction—a clear and marked progress showing that the difficulties of poverty, debt, ignorance and apathy can be and are going to be removed. Not only so, the co-operative idea has been assimilated and the principles of practical co-operation grasped. A close study of the reports would show that self-reliance and self-help are exhibited to a surprising extent and what is best of all the ryots and villagers who forming practically the whole of the movement show intelligence and capability conclusively answering the scepticism which distrusted their ability to manage their affairs unaided.*

My intention, in this paper, is not simply to describe the progress of the movement. Neither is it at all necessary to dwell at length on the advantages. On many an occasion it has been done. But to put the whole thing in a nutshell, I should say that there are undoubtedly three sides of the movement—economic, moral and political and if

* The Hon'ble Mr. Carlyle in his welcome speech of the last Conference of Co-operative Credit said that the past year had shown that many difficulties still remained but they had reason to congratulate themselves not only on the general progress made but also on many indications that public interest had been aroused.

we adopt wholesale the principles of the movement we will see that working on proper lines it would promote a feeling of concord among us, our raiyats and agriculturists who, forming the 90 per cent. of our population are our real prop, would learn the art and rudiments of self-Government and we would see our position improved and elevated at no future date. It would be no exaggeration to say that it would be the work of a miracle.

So our raiyats must thrive. But how can they thrive under the load of high interest ? I append here a table showing the rates of interest in the different districts of Bengal. Saran 12 to 18 per cent., Champaran 25, Darbhanga 24 to 37½, Monghyr 24 to 37½, Bhagalpur 25, Purnea 30 to 37½, Bankura 37½, Midnapur 30, Nuddea 37½, Twenty-four Pargannas 34, Murshidabad 24 to 37½, Jessore 37½, Khulna 35, Balasoor, Cuttack, Puri 37½, Ranchi 37½ to 75, Hazaribagh 75, Manbhum 37½. In the Eastern Bengal districts, the prevailing rates are often higher, going up in some localities to as much as 150 per cent. In Assam, they exceed 75 per cent. In the jute producing districts where the indebtedness is excessive, the rates are often from 150 per cent. to 600 per cent. in the case of Mahomedan money-lenders. The rate generally paid in kind is often 300 to 720 per cent. In a case at Jamalpur in the Mymensing district, the plaintiff claimed interest at the rate of 1,340 per cent. while the Munsiff granted decree with simple interest at 131¼ per cent. per annum.

What would come out of it ? I should say, nothing and absolutely nothing. The shackles and fetters of perpetual debt must be taken off before the poor captive raiyat can aspire to enjoy once more purer air.

A change is, however, taking place and it is urgently necessary. As the Governor of Bombay in a speech which he had delivered to the Members of the Conference of Co-operative Credit said "I do not know of any better object to

Prevailing
rates of
interest.

What should
be out
aims ?

which educated Indians having some leisure at their disposal could devote their energies than the furtherance of the Co-operative Movement. Practical work for the good of others is the secret of true happiness. Those who will give their time and thought to the movement directed to the welfare of the cultivators will reap an abundant and lasting reward." To put the same sentiments in other words as Mr. Gourlay our present Director of Agriculture said in the Third Indian Industrial Conference at Surat "Money will come but we want men who love the country and its people: men who are willing to give their time and their labour towards helping their struggling brethren. Men who believe in this work and who are in entire sympathy with the people. There can be no grander work than this. It demands no great power and no great learning, it demands only sympathy and patience. It is the grandest work that a man can take up for his country."*

How the principles can be fully utilised will be exemplified in the following description which I append of a Co-operative Credit Society and which I would call *the ideal Credit Society*. This Society is near Benares and is indeed a real living society. It does not make its advent only on occasions when questions of loan are to be considered. To make it a very useful institution, meetings of all the members are called twice a month on full moon and on new moon days and attendance is compulsory. At these meetings village disputes are settled and religious books as well as books on scientific and agricultural subjects are read. Since this

* Mr. Earle at the last Bankipore Exhibition emphasised on the desirability of educated youths turning their attention to industries in preference to purely literary occupation and expressed the hope that "it would be probably found that capital would be forthcoming if the younger generation could really produce capable men to take charge of the work." Commenting on this the "Bengalee" said "our young men should qualify themselves to be captains of the great industries which are awaiting development at their hands. There ought to be a change in the temper of the public mind."

Arbitration Committee was started, *no one has gone to the Law Courts.*

The functions of the society are not only confined to the above. Here is another item—a very laudable one. In addition to the above, another thing which the society has done to reach the hearts of the members is to try to repair a tank of the village, which has partially filled up and remains dry in the summer. As no man in the village is rich enough to undertake this, the society has resolved to accumulate a reserve fund and invest it for the common good of the members. Since however the growth of this fund would be slow, the committee is endeavouring to hasten the accumulation. With this object in view, it has sown and is cultivating a bigha of sugar-cane field on behalf of the society to which the members are by turns giving labour free. The profits of this fund will go to swell the reserve.

There is something more. During the last famine when gratuitous relief was distributed by the Government only one person from the village was nominated by the supervisors. There were, however, several destitute persons in the village needing help urgently and in order to relieve them, the members of the Co-operative Credit Society—our Ideal Society men—started a subscription, collected some funds and supported three persons for three months.

But the great thing about this was that the subscriptions were deposited with the Society as the institution of the village by its committee and the fact was brought home to the minds of the recipients and others that they have a *living and useful* institution working in their midst. Would there were such societies in all parts of India.

Commenting on the work of this Ideal Society, "The Irish Homestead," the organ of the Irish Agricultural Organisation Society thus says in its issue of the 24th July. The extract is

Why so ?

Practical
utopia.

An unique
feature.

The Irish
Homestead.

a long one but as we are confident that it will amply repay perusal, we make no apology in quoting the whole of it:—

“Ancient and modern India—India always fascinates the imagination of the west. It is the typical eastern country. We all in youth have imagined it blazing with tigers and thronged with elephants, every bird a flying rainbow of colour, and every man dusky and laden with jewels and every woman a moon of loveliness. The early poets did that for us. There were references to the wealth of Ormuz or of Ind, and to the gorgeous East. As we grew up we began to realise that the wealth had gradually been transferred to Western Bank accounts and the land of genie and of enchantments, of sultans, temples, pagodas, mosques, minarets and mysteries created by the poets was only a glittering illusion and the India of our youth, peopled with enchanters and marvellous even as the imagination of Arabian Story teller, has changed to an India peopled with men and women like ourselves. Never was a fantastic dream cut down so swiftly as when we read a letter in “the Bengalee”* discussing the operations of a Credit Society in Benares. Here were no enchanters, but people like ourselves in Ireland working an Agricultural Bank. The poetry has not all gone out of our vision, for we mind that the Committee Meetings are held on the days of the full moon and the days of the new moon. We like that lunar touch and it sometimes links up the new India to the old India of our imagination. Any how, the members seem to be very kindly people with the true spirit of Co-operation in them. Attendance under the new moon and the full moon is compulsory in the village. Here village disputes are settled and since the society started no one has yet gone to the Law Courts. At the meetings, books on scientific and agricultural subjects are read, together with religious books. We

* This was discussed by me both in *The Empire* and in *The Bengalee* in the second week of March, 1909,

hope we are not still under the influence of youthful misconceptions about India, but our imagination will get incorrigibly picturesque when we think of these meetings with the full moon, science, agriculture and Brahma playing each their part.

“ This Benares Agricultural Bank is exactly in constitution like our own banks but seems to have a rather more progressive spirit than most of ours have. We think of India as so hot that people can work only in the chilly heart of midnight and that energy of any kind would cause the energetic persons to meet away speedily into a perspiration and that one could only keep the solid condition rather than the fluid by maintaining an oriental indolence. But this seems wrong, because the society repaired a tank which was filled up in the Summer ; a reserve fund was accumulated and invested in repairs for the common good so that water might be plentiful in the summer season. To help in this work a plot of ground was hired and planted with sugarcane. All the members worked in turn at the cultivation of it, giving their labour free. The profits of this go to swell the reserve fund and to keep the village water supply in good order. There is yet more. During the recent famine, when the Government was distributing gratuitous relief, the members of the society started a subscription and collected enough funds to support three destitute persons for three months. We begin to think with more affection of the real India than the India of our imagination.

The Editor thus concludes “ It is becoming a great movement there and is entering the villages and the villages are being brought into contact with Central Banks and a sense of solidarity will spring up, as a result of all this work, we have no doubt, which will prove of incalculable benefit to India. *We have no doubt that finally through these rural organisations, those vast silent multitudes of*

India and Ireland.
Editor's valuable conclusion.

Indian peasants will be able to find a voice to express their needs and an agency for progress which they never had before. It is true of India as it is of Ireland ; it can never feel itself a nation or a country unless through organisations which will link the man in the villages together and which will again link the local societies to great Central Unions, and which will finally evolve not the spirit of caste or party, but the spirit of union all over the country."

We say "Amen" with all our heart. A change is indeed taking place. All over the whole country we can breathe a purer and hallowed air of co-operation. It is to be remembered that in Bengal men of the stamp and calibre of Maharaja Mahendra Chandra and Sriyut Sarada Charan Mitra have joined the movement. The clouds were very dark but a silver-lining is distinctly traceable. The Young men's Zemindari Co-operative Society is more in the right direction.*

Back to
Mother.

Really we are back to the Land again—
back to our dear Mother again.

* The scheme put forward by Sir D. M. Hamilton before the young men who assembled in December last under the auspices of the now defunct Anusilan Samity was made specially attractive by his offer to accept the initial financial risks attendant on the project. His suggestion—and this has been put to practice—was the formation, by the young men assembled of a C. C. S. in order to secure a tract of land 5000 bighas in extent, in the Sunderbans, within easy reach of Calcutta. The cost of reclamation be estimated at Rs. 14 per acre and he expressed his willingness to finance the experiment on the security of the land reclaimed. The management of the undertaking as he said then would be in the hands of a Committee carefully selected by the society. This has been done now—and the profits would be employed in increasing the capital of the society. Sir Daniel offered to let the members of the society, rent-free for a year, 500 bighas of land which is ready for cultivation in order that the members might make experiments during the next rice season. If the experiment should fail, Sir D. M. will bear the loss ; while should a profit be accrued, it will be added to the capital of the C. C. S. Such was in short the plan and project of Sir D. M. Hamilton and to a great extent a shape has been given to it and work has also commenced.

COMMERCIAL EDUCATION AND INDIAN INDUSTRIES.

BY PROF : SOHRAB R. DAVAR, F. S. S.,
Davar's College of Commerce, Bombay.

Commercial Education is one of the master pieces of the age that owe their very existence to the wonderful progress of modern times, the fruits of which the intellectual world of the day is privileged to enjoy. Even in England, the leading commercial country of the world, it was unknown until a comparatively recent date. It has therefore a brief history within which the high degree of perfection it has attained compares favourably with the other branches of liberal education,—a record that fills its exponents with just pride. This rapid advance of Commercial Education would not at all be considered as surprising, if one gives a thought to the important part “Commerce” plays in the world. On the contrary it seems incomprehensible why “Commerce” which has for generations been ruling the destinies of nations contributing no less to their prosperity, progress and power should not have been considered a fitting subject to be made a specialized study of. The need for Medical Education, Legal Education and the like was recognised long ago but Commercial Education, and education which should have ranked equally if not first among them all, was lost sight of until a comparatively recent date.

The first city to recognise and introduce this education on a practical and scientific basis was Antwerp with which rests the honor of giving the world its first Commercial College in 1852. Brussels, Berlin, Switzerland, Louvain, Liege, Mons, etc., soon followed suit. America and even Oriental Japan did not lose much time. The experiment all over these countries proved so successful that the Governments of these countries through grants and other means helped the Colleges and Schools of Commerce to multiply which they did admirably.

The influence of this activity on the part of those European countries that went in for Commercial Education in such right earnest was that it worked towards their remarkably steady progress in the commercial world. It gave in fact a happy turn to their National History. England, which has been enjoying for centuries the unique distinction of being the leading commercial country of the world, and whose children are thus armed with the practical grinding of generations, was taken by surprise some years ago when the Germans so successfully began to storm the foreign markets that it had hitherto considered as its special preserves. At first they failed to understand how these inexperienced new-comers could make a stand at all against a nation that had weathered the storms and turmoils of centuries and had—as they confidently believed—inherited exceptional business capabilities and business instincts. They found themselves driven back inch by inch in the great commercial strife that ensued and at last they thought it time enough to investigate into *pros* and *cons* of this unexplained strength of their rivals. The result was not far to seek, for the great Schools of Commerce in Belgium, France, Germany, Austria and America were famous for the good work they were doing. In France and Germany the diploma granted to the successful candidates in Commercial Examinations reduces the term of compulsory military service thus placing this diploma on par with those for Law and Medicine. When we compare the progress made within the past fifty years by various countries we find that America stands out conspicuously with hundreds of commercial and business schools whose students number above 100,000. The Universities of California and Chicago took up this branch of education seriously.

Thus when the British nation was brought face to face with this problem, the practical instincts of the race were not slow to feel that in this one particular direction at least,

its rivals had succeeded in stealing a march over it. Steps were at once taken to make up for lost time and that great institution, the London Chamber of Commerce appointed a Special Committee for Commercial Education which framed out a model scheme for imparting Commercial Education to England's rising generation. This was some fifteen years ago and rapid progress has been made since. The Universities of Birmingham and Manchester have special faculties of commerce with the diploma of "Bachelor of Commerce" for its prize to the successful student.

In India we regrettably neglected this education with all other forms of Industrial education. The little we have in form of our industries does not make the desired progress because "Industry" without the intelligent co-operation of its handmaid "Commerce" is like a ship deprived of its capable commander. We know that our countrymen are noted for their commercial instincts. We are also aware of the great economical advantages that our country enjoys. We are equally aware that in face of all these favourable circumstances we have yet failed to attain the high position held to-day by the great commercial nations of the world. It is because our merchants mostly lack the faculties of organization and the all important self-confidence which a polishing touch of business education alone, can supply.

In our present position we find the same causes working against our Commercial and Industrial progress that were prominent in Europe in its days of business infancy. The merchant father who has an established business which cost him a life-time to build up or who inherited an ancestral business firm finds, that his University trained son displays a total indifference to mercantile pursuits which often develops into a hatred. He shows a marked inclination to one of the learned professions or prefers to live a gentleman at large. On the other hand, if the merchant father neglects the son's education, the

result is that the business with the increasing competition around it, does not rise beyond certain narrow limits. Often the ill-educated son ends his business career in disaster.

The above results are natural, because in the former case the University course of liberal education develops faculties different from those in demand in the commercial world, whereas in the latter, there is no intellectual development at all. If on the other hand, these young men on completion of their ordinary school education were left in charge of tried Commercial Educationists to be trained in their Colleges for High Commercial Diplomas, the specialised education would not only create a love for commercial pursuits but would arm them with a knowledge, which besides polishing and developing their intellectual faculties, would place them in a condition that would enable them to develop and improve the business of their fathers. This continuity helps the business to develop into gigantic proportions. If one was to look into the origin of many leading British firms that are to-day practically controlling the various branches of British Commerce, one would find that these magnificent concerns, a century or so ago, had a modest beginning at the hands of one of the ancestors of the family whose name they bear. In India, on the other hand, a business that has been developed by an enterprising merchant in most cases dies a sudden or lingering death after its founder has passed away, either owing to the contempt of the University trained sons for a business career or the incompetence of the uneducated or badly educated sons.

The extent of the wonderful progress made by the industrial and commercial world of the day, can hardly be conjectured by the stay-at-home Indian and even among those Indians, who have travelled, there are a few who have realised its magnitude. When one visits the gigantic concerns in Europe where the employees number by thousands, in face of all that the present day improvement in

the labour-saving devices has to teach us, one cannot help getting lost in thought as to how the Head or Manager of such an establishment can keep his mind in its proper place. It is in such concerns that the old school idea of learning business-methods by working as candidates in business offices exposes its most ridiculous hollowness. The allotted span of the human existence is too short a period to enable one to grasp the details of business methods of the the present day establishment of the class referred above, through such a clumsy and antiquated medium. Here, those highly trained in business college alone, can expect to secure a footing that gradually leads to the highest place. The ignorant and untrained novice stands poor chances, indeed. Can we expect to see such a day of industrial and commercial greatness in India? Our largest business and industrial concerns, poor as they are in comparison with those of the west, are more or less under the supervision of imported experts from the western side of the world. Others are in charge of Munims or Managers who are given all the departmental work. The Munim is the buyer, seller, cashier, ledger-keeper, godown-keeper, private secretary and what-not of his master or masters. He may have in some cases one or two illiterate hands to wait on him. His own education centres in his service of his master. He though poorly paid seems to be thriving. The business seems to go on and without proper records, checks or counter checks. Every thing seems to be right, till a catastrophe occurs, when the whole fabric seems to topple like a pack of cards leaving things in the most confused state. So long as this Munim system on old lines is persisted in, I am afraid the industries or commerce of India do not stand much chance of improvement. We have to-day to hold our own against our most advanced competitors from the west. The only course laid open to us is to meet them on their own scale, armed with the up-to-date training in industries and commerce and run our enterprises on large lines.

Fortunately, there are many healthy signs around us at present the advantage of this opportunity should be taken to stimulate our enterprise and to make them attain their natural height by turning out a large army of highly trained commercial and industrial experts of our own.

THE TEXTILE INDUSTRY OF INDIA, ITS PRESENT CONDITION & FUTURE PROSPECTS.

BY S. D. SAKLATVALA, ESQ., B.A.,

Empress Mills, Nagpur.

The Textile Industry of India has for some time past claimed a good deal of the attention not only of those directly connected therewith, but also of the public in general. This is not surprising, as this industry is not only our premier industry, but certain circumstances, favourable and otherwise, have arisen of late, which have forced those interested in the industry to look beneath the surface and grapple with questions, which in years past were lightly brushed aside. The problem of labour, the difficulty of dealing with strikes, the question of short-time working, the want of technical education, the task of housing the operatives, improvement in the cultivation of cotton, the rise in wages, and at the same time growing home and foreign competition, all these questions came up in turn and forced the lethargic mill-owners and agents to devote their energies to some extent at least to the cause of the industry they represented, whilst at the same time the so-called "Boycott" and Swadeshi movements, whatever be their origin, served to direct the attention of the general public to the conditions of our industries. And last but not least, the appointment of the Factory Commission—thanks to certain abuses—led to the unfolding of a story, which made it apparent that certain changes were necessary in the interest of the operatives, as well as of Indian industrialism itself. The year of boom, which served to substantially build up the resources of most concerns also brought in its train certain abuses. However, it is a matter of congratulation that

these abuses were soon detected and led to the introduction of the New Factory Bill (of which hereafter) which has certainly improved and brightened the future prospects of the industry.

This industry can now no longer be said to be in its infancy. It has now passed through many vicissitudes, and though carried on in the past by more or less inefficient labour, under ill-qualified supervisors, and in many cases by managers, who were merely content to follow old-time methods, and presided over by greedy agents, who looked more to their personal gains than to any improvement in the industry, and in spite of many corrupt practices—this industry stands to-day on a fairly strong basis. Such an industry no doubt must have a vitality which is not common to all other industries—such an industry must possess some inherent qualities which support and prop it in adverse circumstances. Indeed, it has not only grown in spite of many follies and disasters, but actually prospered, and hence we need never despair of its future. The present depressed conditions perhaps, in the opinion of some, may not warrant such a conclusion, but a study of the growth of the mill industry in India should dispel every doubt, and give us every confidence in its future. That many reforms are necessary, if we are to see our hopes fully realized, stands beyond question, but surely our experience of nearly half a century ought to suggest remedies and ensure future success.

Let us, then, briefly review the present state of the industry and see what reforms are necessary for the improvement of its future prospects.

The present state of depression is due to several causes, but it is by no means so deep-rooted as to mar all future prospects. The state of industries and commerce the world over has passed through gloomy times at present and it would be futile to expect that the Textile Industry of India would escape the general depression. Apart from this general consideration, there are special causes why our own industry has suffered. Successive seasons of bad crops must necessarily exert a very pronounced effect on our home market, and to this was added the absence of the Hindu "Marriage"

season. Besides there has always been the want of a joint effort by our mills to exploit foreign markets, whilst mutual rivalry in the home market leads them to look up to immediate gain only without any attention being paid to the future of the industry. The evil was further aggravated by a considerable increase in our production just at the time when the market was in a depressed state, the increase being due to the extensions which followed the year of unprecedented prosperity. The Swadeshi movement, however, gave us a certain opportunity to replace to some extent at least the products hitherto supplied by our English rivals, but even this was half lost by the short-sighted policy of turning out worthless goods to compete against the fine products of Lancashire. As regards foreign market, every effort should be made to keep hold of those already established by supplying uniformly goods of a superior class, whilst a systematic effort should be made to push goods into new markets, adapting ourselves to their standard. If we next look at the products which supply our home market, we find a woeful lack of originality, and in many cases a mere servile following of the better classes of mills. It is by no means an uncommon weakness to mark inferior goods with the same number as similar superior goods by well-known mills. A great ingenuity will also be displayed in turning out a label which resembles as close as the law will permit the well-known marks of some other mills. In fact as regards the general make-up of certain classes of goods, every facility seems to be granted to unscrupulous merchants to pass the goods of one mill for those of another. This certainly cannot be classed under healthy competition. Instead of frittering away their energies in thrusting worthless imitations on the market, it would be far better for themselves and the industry, if their energy was directed towards the improvement of their own goods which could then stand on their own merits. Why can our mills also not specialize, certain mills supplying certain lines only? Such a policy, as is now followed, may bring profits for a short while to particular concerns, but in the long run is bound to spell ruin for the industry generally.

The same may be said of short-reeling in spinning which has already tarnished the good name—if ever there was one—of Ahmedabad yarns. Such practices as these also have the way for successful foreign competition. Japan is certain to oust us from the China market if we are not able to maintain the quality of our yarn. With the improvement of exchange, there is no reason why India should not maintain a large and lucrative business with China. As regards Lancashire, the present condition of their trade is not less depressed than our own, and the rivalry, therefore, in spite of past mistakes, is by no means unequal. If we fail, we shall fail through our sheer want of ability to drive away foreign competition by turning out products of equal quality.

However, in this connection, one cannot help deploring the palpable injustice which is being done to the Indian industry by the levying of the iniquitous Excise Duty. Much has been said about this, and all we can say is there is absolutely no justification for such a duty. This is a long-standing grievance and the sooner it is removed the better for our Textile Industry. No country in the world levies a duty on its own manufacture, and though this duty may be justified in some quarters by economic sophistries, it is obviously unsound from the economic and indefensible from the moral point of view. Whether it is an indirect benefit to our rivals or not, it is clear, it unnecessarily hampers our own industry and mill-owners must constantly agitate for its reform. One would be almost tempted to think an intelligent and benevolent Government that can frame the New Factory Bill would scarcely hesitate to take sides equally with the mill-owners as with the operatives for the good of the industry itself, without the necessity of a constant agitation.

But to return to our subject, honest Swadeshism has widened the scope of our home industry and our main object must be to create a demand for home-made in place of foreign goods by supplying articles of equal quality at a slightly lower rate. If we are to drive away in a great measure our rivals from the field, the products of our mills must be of a better texture and finish and

greater attention should be given to up-to-date methods of dyeing, bleaching and mercerising. The clouds of gloom which hang on the horizon of the world's commerce and industry, already seem to dispel themselves slowly and we must be fit to take full advantage of the dawn of prosperity whenever it comes. There is no doubt, India will have her full share of this prosperity, far from all reports our crops for the coming season will be excellent. But our main object must be to attain permanent results and build up the industry on a sound economic basis so as to make it the most glorious asset of India. These words may sound extravagant in view of the present gloom, but there is every reason to predict a glorious future for the textile industry, provided it is purged of some of the worst abuses, which still prevail. Let us hope the wave of reform, which seems to pass over our country at present will embrace economic and industrial reforms equally with social and political ones.

A beginning of such an economic reform has at last been made and all well-wishers of the industry, will welcome the advent of the New Factory Bill. The Bill as drafted now may and does require a few amendments here or there, but every one must welcome the main principles on which it is founded. This Bill may not be approved of at present by some or most of our mill-owners, but is bound to prove beneficial to these very men and the industry they are interested in. Great credit is certainly due to the Government which, in spite of protests from interested quarters, have firmly come to the rescue of the operatives, and indirectly benefitted the textile industry which is bound to improve under healthier labour conditions. Let us hope no material change will be made in the Bill before it is passed into law. The reform which was most needed for the future success of our industry was the improvement in the condition of our labourers. Labour which is dissatisfied and over-worked is bound to be unskilful and uneconomical. It cannot be denied the new Bill has raised the status of textile labour and given it what was due to it. Under existing conditions Government intervention was imperative, and the introduction of the Bill is a step forward in the right

direction taken at the right moment. It only remains with mill-owners and managers to carry out the spirit of the new Bill, and they will have achieved one of the most important reforms necessary. It is also satisfactory to note that of late greater attention is being bestowed on the comforts and well-being of the hands by the mill-authorities.

However, it must be remembered that whatever be the skill of the common workmen, they can never work together successfully, unless supervised by qualified men. Therefore, another point, which must be looked to, is the imparting of technical education to our youth with a view to fit them to be leaders capable of organizing and guiding our labour. Our youth must be taught to attach the same value to industrial as to literary education. We must not only look to our Education Department to supply the want ; the combined efforts of our mill-owners can do much in this direction. In fact, as far as textile industry is concerned every mill can be a training ground for apprentices. For the present, there is a sad dearth of men really qualified to take charge of large and varied concerns. Our industry has now grown to such an extent that we cannot employ European experts in sufficient numbers without incurring a pecuniary loss. If we cannot yet dispense with them wholly, let us yet make an effort to supplant the majority of them and keep the money spent on them in the country. Surely we have had enough experience in the line to be able to dispense with a few foreign experts, who in spite of their technical knowledge are ignorant of local conditions.

It has always been said that the wealthy native of India prefers to hoard his money to investing it in profitable industries such as the textile. I am inclined to believe, it is as much business acumen as a love of hoarding that prevents him from investing in an industry which is not in very competent hands. Let there be men thoroughly acquainted with the details of the industry and possessing the necessary qualities of organization and there will not be such a complaint of want of enterprise. In passing, however, it must be said that though there is a vast scope for the expansion

of our industry as is apparent from our import trade, it would be well to improve and make stable the present concerns, and train workmen whom the limit imposed by the new Bill on working hours will surely attract. Finally what is of greater importance still is, those who would be at the helm of the industry as its trusted captains, must be men not only of ability but of honour and integrity, who have in view not merely a certain amount of profit, but the furtherance of the industry, and the improvement of the methods and men employed therein. If we turn our eye to the successful concerns of our present day, we find they were built by men of sound principles whose desire was to further industries, develop the resources of the country and give employment to Indian labour whilst at the same time earning a deserved profit for themselves; whilst those that have failed were built for the greed of the agents, or advantage of machine suppliers without any view to the good of the industry.

The incoming of the new Factory Bill marks an epoch in the history of the mill industry of India. Let us hope it will bring in its train other reforms as well and put the industry on a sound footing giving a reasonable return to the shareholders and a fair wage to the labourers, which can only be done by the combined efforts of the mill-owners. Attention must also be paid to the cultivation of cotton. We are more favourably situated with regard to our raw product than our rivals, but hitherto we have not taken full advantage of our opportunities. Every attempt must be made to improve the quality and quantity of our raw product. The present situation of the American cotton market ought to urge us on to find means to be independent as regards price of the American market which seems to be guided not on natural principles of demand and supply but mainly depend on the prevailing speculative elements. Efforts are made by the Agricultural Department but these ought to be adequately backed up by private enterprise supported by the local mills.

We cannot conclude this review without alluding to another point of great importance to the industry—*viz.*, reserve funds. It is absolutely essential for the stability of

the industry that substantial reserve funds should be built up. Most mills have some sort of funds for the purpose, but either they are totally inadequate or exist only in the mill report books, the sum set apart being used up for purposes other than intended. It is beyond question that a concern having a large reserve at its back can easily tide over difficulties during years of depression like the present.

I now only have to add, no one need take a gloomy aspect of the future of textile industry. During the days when so much is heard about reforms, political and social, we have certainly a right to expect people will be equally alive to the necessity of industrial and economic reforms—if not the agitation for reforms in other directions would mean little and would seriously reflect on the earnestness and ability of our leaders and captains of industry. Let us then hope, men will not be wanting, who will rise to the occasion and prove themselves equal to the task of remodeling our textile industry on modern lines, and thus assure its future prospects.

A PLEA FOR NAVAL SCHOOLS AND COLLEGES IN INDIA.

BY M. B. SANT, ESQ.,

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Even the most casual observer of current events will have to admit that a wave of general awakening is passing over this ancient land of Arya Varta, and it has infused a new life and enthusiasm into the inert and indolent masses of India. The sudden and almost spontaneous impulse, which is noticeable during the last four or five years in the numerous activities, especially those that relate to the regeneration of old indigenous industries and the creation of new ones, is a clear indication of its influence. It must be gratefully acknowledged that the Government has also, to a certain extent, readily responded to this call, and has evinced

ced its eagerness to co-operate with the people by its recent Resolution in connection with the purchase by its various Departments of locally made articles *in preference* to those of foreign make and by affording greater facilities for Technical and Scientific Education by endowing Technical Scholarships for study in foreign countries, and expanding the scope of the existing Technical Schools in India and starting new-ones.

Although, much remains yet to be done by the Government, the municipal and other local bodies, and the educated classes of India, for the promotion and diffusion of Technical training of the superior type, it is a matter of consolation that a beginning has been made, in this direction, and promises fruitful results in the near future. There is, however, one important branch of Technical Education which appears to have been completely ignored both by the Government as well as by the people ; I mean the Art and Science of Navigation and Naval Architecture.

From the latest contribution by Mr. Radha Kumud Mukerjee, lecturer in Economics at the Bengal National College, Calcutta, on " The Seaborne trade of India, " it appears that so far back as thirty centuries ago, India was acquainted with Inland and Ocean Navigation and her mercantile marine carried her commodities and manufactures to the most distant parts of the then known world. The ancient Vedic scriptures, the Upanishads, Puranas and other Brahmanical texts as well as Budhistic works are replete with allusions to Navigation, national Shipping and Shipbuilding, and there are evidences that India once occupied and maintained for a series of centuries her glorious position as the Queen of the Eastern Seas. This shipping activity presupposes a knowledge of Naval Architecture and seamanship of a very high order. We are told by antiquarians that there were in existence several works in Sanskrit on Naukanayan Shastra or the Science and Art of Navigations and also shipbuilding. The names of the books and their authors have been traced but the original works have, in many instances, been either carried away or destroyed by the successive hordes of conquerors of the

olden times. It is related that at the time of the invasion of Alexander, the Great, the passage of the Indus was effected by a flotilla of boats, constructed and manned by the Indian boatmen. During the reign of Emperor Chandra Gupta (B.C. 321 to 297) the development of national shipping had reached a stage, when the Emperor found it necessary to create a board of admiralty. The department was very well organized and at its head was placed an officer called the superintendent of ships. He was entrusted with the duty of not only managing the affairs connected with Ocean Navigation but also in connection with Inland Navigation on rivers and lakes. He may be compared to the modern Port Commissioner and Naval Officer.

Even coming to the recent times, we find that India was not at all backward in navigation. A hundred years ago, shipbuilding and practical navigation of India were in such an excellent condition, that ships were built in India which sailed up to the Thames in company with British ships. Ports of Bombay and Calcutta, contained a large tonnage of shipping of Indian construction, that was utilized for the conveyance of cargo to England. The teak vessels of Bombay were once considered even superior to the English ships made of oak. It is a recognized fact that teak-wood ships last at least for fifty years, whereas oak ships require to be renewed every twelve years. Hence, the teak-wood ships were found by experience to be more durable and economical. Forty years ago, one-third of the tonnage employed in Indian waters, was Indian. The employment of Indian ships for trade between England and India, gradually came to be discouraged, with the result that this important industry has almost disappeared, owing to the fierce competition with foreign shipping, driven by steam-power and well equipped with all the latest improvements and machinery. It has been estimated that in 1857 about 34286 Indian vessels entered and left the different harbours, whereas in 1899-1900 the number dwindled down to only 1676. At the present time with the exception of a very insignificant portion, all the shipping trade as regards conveyance of passengers and cargo, is entirely in the hands of foreign

companies working with foreign capital and the occupation left to Indians is only in the capacity of

- (1) Lascars and Khalashis on a few steamer lines.
- (2) Clerks at docks.
- (3) Stewards.
- (4) Coolies &c at wharves and docks.

In a few isolated cases only, I have seen Indian (Parsee) Engineers in charge of ships of Indian Steam Navigation Companies but the work of captaining and piloting a ship is entirely in the hands of European experts. From the latest figures to hand, it appears that there are only about 10 Navigation Companies in India, under Indian management and financed with Indian capital. But most of them ply over short distances and find it difficult to compete with foreign companies.

Those who have had an experience of a long sea voyage on board some of the magnificent floating palaces, need not be told what huge sums of money have been lavishly expended by foreign companies in the construction of modern steamers, how expensive it is to maintain them, what an amount of skill and vigilance is necessary to work the steamers, and what an enormous traffic is carried on by them, both in passengers and cargo.

It may not perhaps be possible to raise in India sufficient capital to pioneer new Railway lines for the present ; but there is no reason, why there should be no expansion of shipping industry at important ports, like Bombay, Karachi, Calcutta and Madras, on modern lines. The importance of a mercantile marine can never be over-rated, as it is the key-stone to the industrial success of England and other nations. The cost of production of any article, necessarily includes its freight both by rail and sea. Owing to the exorbitant rates charged on goods over the Indian Railways and owing also to the circumstance that India, does not possess her own shipping companies, she cannot in many cases, place articles of her manufacture, in the markets of other countries at a profit. On the contrary, countries, which possess their own shipping, bring raw materials from other places in their own ships for

manufacturing purposes and also convey back the finished articles to the very country, which exported the raw materials. Shipping Industry also provides field for enterprise and skill to a large surplus population. In 1850, England possessed 29,984 ships with a total tonnage of $3\frac{1}{4}$ millions, whereas in 1890, she had 19,751 ships with a tonnage of $9\frac{1}{4}$ millions. Sailing ships of former times have now been replaced by steam ships. One ton of steam is considered as equivalent to nearly 3 tons of sail ships. Another result of the introduction of steam power has been to increase the size of ships, this accounts for the shrinkage in the total number of English vessels.

The foregoing facts are, I presume, quite sufficient to establish the necessity for the revival of this very important branch of national industry. India which has adopted factory system with so much success in cotton, and other industries can succeed in shipping industry as well if the prominent capitalists take to it seriously.

For effecting the revival efficiently and on modern lines of Indian navigation, I would also suggest that Technical, Schools and Colleges of navigation be established at the principal ports of India, *viz.* Bombay, Karachi, Calcutta and Madras on the lines of the following well-known institutions of England:—

(1) Municipal Science, Art and Technical School, Devon Port, (teaches Navigation, Nautical Astronomy, Marine Engineering and Naval Architecture).

(2) Municipal Technical School for Fisherman, at Hull, England, (teaches Seamanship, Fishing and Navigation).

(3) Navigation School, Dundee, Scotland.

(4) School of Engineering and Navigation, London.

(5) The Thames, Nautical Training College, London.

For the diffusion of naval training among khalasis, other sea-faring classes and the general public, important works on the theory and practice of navigation, should be translated into the principal Vernaculars of India. The existing Translation Societies, like the Deccan Vernacular Society of Poona will confer a great boon on the educated public, if they set aside a certain sum every year, for translations of Technical and Scientific treatises on naval and

technical subjects, instead of selecting old classical authors whose works do not possess in the eyes of the present commercial world, any value beyond mere academical interest. Educated men also should undertake the translations of such works, instead of frittering away their energies in writing works of fiction.

I trust, in conclusion, that my humble attempt will serve to attract the attention of the capitalists and the educated classes of India, to the revival of the mercantile marine and the establishment of Naval Schools and Colleges,—subjects which hitherto remain neglected.

THE UTILIZATION OF SOME INDIAN TANNING MATERIALS FOR THE MANUFACTURE OF TANNIN EXTRACTS.

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INTRODUCTION.

It is well known that the Leather Tanning Industry in spite of the various patents taken out for mineral tanning will, still for a long time to come, mainly depend on the vegetable tannin found in varying proportions in barks, woods and fruits of different forest trees. The old method of vegetable tanning by placing the hides between layers of ground bark in a tank was extremely slow, extending as it did over a period of 10 to 20 months. With the progress of civilization, however, it has become a matter of necessity to replace the old method by rapid methods of tanning, the efficiency of which in most cases depends on the use of tannin extracts. The industry of tanning extracts is, therefore, becoming more and more important in France, Germany, England, America and other civilised countries. There is no doubt that the preparation of tannin extracts involves a greater or smaller loss in the quantity of useful tanning principles contained in the original bark. But this disadvantage is more than counterbalanced by the various advantages derived from

the use of tannin extracts. Apart from the fact that tannin extracts are more portable than wood or bark, the former are quick in action, leave practically no residue and are extremely convenient to use in the leather industry. It is, therefore, not difficult to account for the daily increasing tendency of both the European and American tanners towards the use of tannin extracts instead of barks.

The imports of tannin extracts into the United Kingdom for the year 1906 were valued at £ 777,850, while the average for 1897-1901 was only £ 467,118. The total French production of extracts including that of Corsica reached in 1904 about 105,000 tons, representing a value of about £ 1,040,000. In the same year France imported 1841 tons and exported 49,707 tons of the tannin extracts. The German Empire imported 11,005 tons of Querbacho and 27,921 tons of other extracts in the year 1904 and 13,655 tons of the former and 32,603 tons of the latter in the year 1905. The 617 tanneries of the United States of America consumed in the year 1906, 147,049 tons of the tannin extract (in addition to 1,224,412 tons of tan barks), while in the year 1900, this consumption of the extracts was as low as 14,293 tons only. The increasing tendency of the tanners to use tannin extracts is especially noteworthy in the United Kingdom. This will be apparent from the following quotation from "Capital" of the 23rd April 1908. "In the United Kingdom for 1906, extracts represent 7/16th of the total import and private advices declare that for 1907, extracts have already exceeded all other agents by over 20 per cent. In America extracts represent 1/4 of the total production of tanning agents. In Germany for 1906, the proportion of extracts to the whole is a fraction less than 25 per cent., but there are prohibitive conditions attaching to the use of extracts in Germany other than the home-made article, which effectively prevent the cultivation of the improved methods of manufacture or further expansion of the industry."

From the above figures the increasing importance of tannin extracts is clear in connection with the hide and leather industry. The demands for bark and wood for extraction made by different tannin extract factories in Europe and America are indeed so enormous that fears are entertained of the shortage at no distant date of the supply of raw materials from the forests that are being indiscriminately massacred to meet the world's demand for tannin extracts. To take an example, in France including Corsica, Italy and Spain, there are 26 tannin extract factories, (this figure is for the year 1903), with their number daily increasing, which are reported to consume 450,000 metric tons of the chestnut wood. Taking 40 trees to an acre, which yield 150 tons of wood per acre, it has been calculated that the consumption of chestnut wood by the above mentioned factories represents the disappearance of 3,000 acres of chestnut trees annually. In fact at certain places the supply of raw materials is already running short. For instance, it is stated by Messrs. Dumesny and Noyer, the eminent chemical engineers of France, that Corsican deafforestation will before long compel certain tannin factories to engage in the sugar industry (which, it may be noted, can be carried on by the same machinery as is employed for the preparation of tannin extracts), and already beetroot experiments have been organised near Bastia.

The extent of the demand of tannin extracts and the present position of their industry have been very briefly indicated above. Enough has been said to show that while the demand is daily on the increase, the gigantic manufactories of Europe are denuding all the forest lands growing requisite trees to meet it. If things go on at this rate uncontrolled, it is very likely that sometime there will be a world-wide shortage of tanning materials. Rich as the tropical countries are in their vegetation, it may be expected that much of the demand for tanning extracts

will have to be met in future by the establishment of tannin extract factories in the heart of the forests of India and Burma, Strait Settlements, Borneo, Java, etc.—forests that are beyond doubt enormously rich in tanning materials. It may be mentioned here that a large factory has already been established in Borneo which exports mangrove extracts under the name of Borneo cutch to Europe and is carrying on a very profitable business. That there are only two or three factories manufacturing tannin extracts throughout the whole of the Indian continent is a sad commentary on the enterprise of the Indian capitalists. It must be noted here that the Government of India and also the Government of Burma have been doing all that was possible for a Government to do in taking steps to develop this important industry in this country. In addition to a great deal of research work on the tanning materials of India that the Government Departments of Scientific Research have done during the last few years, and the copious literature that has been published on the subject, the Government have established a tannin factory in Rangoon for the manufacture of tannin extracts at a cost of about a lac of rupees, and the Forest Department of Burma is still busy with the organisation of experiments with a view to manufacture tannin extracts on a commercial scale. So far as I am aware, practically no advantage of this enlightened policy of the Government has yet been taken by the people and no steps have been taken by the latter to develop this industry, which promises to be one of the most flourishing industries of India. It is high time, therefore, that the Indian capitalist took time by the forelock and seized his opportunities in this direction.

It is gratifying to note that among the enquiries recently received at the Imperial Forest Research Institute, there is one regarding the utilization of certain Indian Forest trees for the manufacture of tannin extracts. It has, therefore, been thought desirable to compile this

paper with the object of affording general information on the subject to those interested in the development of the tannin extract industry in India. It is proposed first to give a list of the more important tanning materials of India together with a brief summary of the results of the Government enquiries as to the possibility of preparing suitable tannin extracts from them, which have appeared from time to time in various Government publications; and then to give a rough estimate of the capital expenditure required for starting an extract factory equipped with up-to-date machinery for the treatment of both wood and barks. Before describing the Indian tanning materials, however, a list of the tanning material commonly used in Europe may usefully be given here for purposes of comparison.

Tanning agents commonly used in Europe.

Name of the Material.	Average tannin per cent.	Remarks.
Chestnut wood (sound)	7—10	The per centage of tannin in solid extract is about 43.
Do. Bark	3	Do do
Oak wood	10—12	The extract contains 26—28 per cent of tannin.
Querbacho wood	17—20	Solid extract contains 64—70% tannin.
Sumac leaves	25—30	30° B. extract contains 27—32% tannin.
Dividivi pods.	30	
Valonia. (scaly cupules)	15—35	25° B. % extract has 26 per cent. tannin.
Palmetto roots extract 30° B.	26	It is used as a substitute for gambier.
Mimosa bark	29	25° B. extract contains 32% tannin.
Tara from Chili and Peru	30—31	Do do
Myrobalans from India.	25—35	Solid extract as manufactured at Raneegunge contains about 40% of tannin.

SOME INDIAN TANNING MATERIALS.

I. TAMARICACEÆ.—

The galls of three species of *Tamarix* family, namely, *Tamarix gallica*, Linn., *T. articulata*, Vahl., *T. dioica*, Roxb. contain about 50 % of tannic acid, being, therefore, as valuable as the Oak galls. A sample of the bark gave about 8 % of tannin and 19 % of total extract. It is evident, therefore, that both the bark and the galls of these species can be very profitably utilised for the manufacture of tanning extract.

II. DIPTEROCARPACEÆ.—

D. tuberculatus.—In 1898, an extract was prepared from the bark of *D. tuberculatus* in Burma, and it gave 24 % of soluble tannin. It may be noted here that this bark is capable of yielding a much richer extract if prepared on scientific lines. The method of preparing the above extract was evidently very rough, and much of the tannin was lost by heating in open air.

Shorea robusta or *sal bark*—This bark is a valuable tanning material, though till now it has been very little used. Large quantities of this bark can be had as a waste product from the forests of U. P. and Bengal, which can be profitably turned into extract, if due attention is paid to the systematic collection and transport of the bark to a centrally situated factory. The bark of the old sal trees yields 8-9% of the extract and the young sal bark about 14—20%. The tannin calculated on the dry bark is in the case of the former 5% and in the case of the latter 9-12%.

The extracts experimentally prepared from this bark as examined by Professor Dunstan of the Imperial Institute, London, gave only 21% of tannin. Here again the conditions of preparation of small quantities of tannin extract are to be blamed for this low value. In the opinion of the writer, the extract from the sal bark under proper conditions can be concentrated to yield 40—50% of tannin. Professor Dunstan remarking on the above men-

tioned results recorded in his report indicates the possibility of preparing this extract which when employed as a tanning agent furnishes leather of good texture and colour.

Valeria indica.—The fruit of this species gives tanning extracts of fairly light colour. As analysed by Dr. Leather, the fruits gave 25 % of tannin with only 12% of soluble non tannin.

III. STERCULIACEÆ.—

HERITIERA LITTORALIS, Dryand.—The bark from this tree is reported to be remarkably free from any objectionable colouring matter and has 14% of tannin in it.

IV. ANACARDIACEÆ.—

Odina woderi.—The bark of this tree has 9% of tannin.

Mangifera indica has 16% of tannin.

Pistacia integerrima.—The galls of this tree, known in vernacular as *Kakra singi*, contain as much as 75% of tannin in them. They may be said to be Nature's concentrated extract of tannin, and are very useful in preparing mixed tannin extracts.

Rhus paniculata, WALL.—The bark of this tree as examined in the Economic Laboratory of the Indian Museum, Calcutta, gave about about 22% of tannin, while an extract prepared from the bark contained 82% of tannin. This percentage seems to be too high, but assuming that the average percentage of tannin in the extract is 60—70, it will be seen that an extract of such a concentration can easily realise high prices in the European market.

V. CORIARIACEÆ.—

Coriaria nepalensis, WALL.—All parts of this plant are said to be rich in tannin. The leaves contain 20% of tannin, and it will be interesting to experiment with their extract as a tanning agent.

VI. LEGUMINOSÆ.—

Acacia arabica, Willd.—The bark of *Acacia drabica* is one of the most popular tanning agents in this country.

It gives almost as good a leather as the famous wattle bark of Australia. One tannery alone of Messrs. Cooper Allen Co., Cawnpore, consumes 500 maunds of this bark every day. The bark contains about 17% of tannin and 6% of soluble non-tannin. The pods of Babul are said to contain varying quantities of tannin from 5—20% according to their age, the younger ones being richer than the mature ones.

The extracts prepared roughly on a small scale from the bark and the pods of babul gave 30% and 23% of tannin, respectively.

Acacia catechu.—This is the famous Katha yielding tree. Both the bark and the wood of the tree can be utilised for manufacturing tannin extracts. From the wood they prepare katha in certain localities which is sold locally for edible purposes. Simultaneously with the manufacture of katha, the writer is of opinion that a good light coloured tannin extract can be prepared as a by-product from the wood, but the operations will have to be carried on a much larger scale than is at present done, with up-to-date machinery. Under proper conditions a product almost like Gambier, a tanning material much in demand, can be prepared from this tree.

The bark of the tree is also capable of yielding a good tannin extract.

The tannin extracts from *Acacia catechu* can be easily concentrated to yield 60—70% of tannin.

Acacia leucophloea.—The bark of this tree contains 21 % of tannin and is reported to be as good a tanning agent as the babul bark. The wood of this tree may possibly be of use for wood pulp in which case the bark will be a waste product and available for the extraction of tannin.

Calsalpinia coriaria, Willd.—This is the American sumac or dividivi. It was introduced in India in 1834, and it has been cultivated in many districts of India with

considerable success. The pods from this Indian grown dividivi give 30—50 % of tannin.

Calsalpinia Digyna, Rottl.—This is an indigenous species of dividivi growing freely in Burma, Assam and Bengal. It can be cultivated with great ease. The pods from which the seeds have been removed show over 50 % of tannin and in certain samples the percentage rises as high as 60. This may be regarded as pre-eminently a ready made tannin extract manufactured in the great laboratory of Nature. A chemical examination of these pods was made at the Imperial Institute, London, and the results of chemical analysis were confirmed by practical trials of the extract prepared from the pods in the tanyard. As a result of this investigation, Professor Dunstan considers the pods of *Cæsalpinia digyna* of India to be one of the richest tanning agents possessing properties of special value which render it of more importance than the South American dividivi.

Cassia auriculata, LINN.—The bark of this species known as *lawar* in C. P. and *langadu* in Southern India is a valuable tanning material which according to Mr. Hooper contains 11% in the bark from young trees and 20% in that of the mature trees.

Xylia dolabriformis, BENTH.—This is the famous pyinkado of Burma, Bombay and other places. A large quantity of pyinkado timber refuse or dust is available and may form a useful source of tannin. The specimens of saw dust and chips of pyinkado gave 6 and 5% of tannin, respectively. An extract prepared experimentally at Pyinmana according to the analysis of Professor Procter contained 32 % of tannin and 58% of water. With regard to its tanning properties Professor Procter reports: 'In its low percentage of soluble non-tannin as well as in colour it resembles querbacho. It might become a very useful tanning material.....A sample of leather tanned

in 1% solution is reddish but not more so than querbacho or mimosa."

To have drawn such a favourable report from Professor Procter for an extract not prepared under the best conditions for making good extracts shows the high economic value of pynkado dust or refuse as a starting material for making tannin extracts.

VII. RHIZOPHORACEÆ (THE MANGROVE FAMILY).—

The species of this family are by far the most abundant and richest tannin yielding trees. As mentioned above a large factory has been recently established in Borneo for the preparation of extracts from mangrove barks. The efforts of the Government of Burma are also concentrated on the production of extracts from mangrove. So far the extracts yielded by *Rhizophora mucronata*, Lamk have proved to be the richest tannin extract in the market. The only objection that is made to them by the tanner is their being of too red a colour and their imparting an objectionable purple violet colour to the leather. But the objectionable colouring matter in these extracts may be found capable of elimination. Further, just as the dark coloured extracts of Querbacho and Palmetto are advantageously utilised in Europe in mixed processes of tanning, it appears possible that a judicious mixing of the red coloured extracts of mangrove with light coloured extracts is capable of yielding satisfactory results. Another advantage of suitably prepared mangrove extracts is that their active substances are quickly absorbable by the hides and the tanning can be effected with very weak liquors; further, there is no necessity to increase the strength of the liquors in the final stages of the tanning process, as has to be done in the case of other vegetable extracts. The high amount of tannin in mangrove extracts is a great recommendation in their favour, and the tanner is already beginning to see his way of utilising them to his best advantage. In fact, Borneo cutch has taken the market already and is

being sold at 15-20 shilling per cwt. For the reasons stated above there seems no reason why the Indian mangrove extracts should not similarly find a ready sale.

The bark of the *R. mucronata* contains 26-30 % of tannin and the extract prepared from the same have 72 % of tannin with a water content of about 16 %. The Rangoon extract is richer in tannin than even the Borneo cutch. Experiments instituted by the Imperial Forest Research Institute Dehra-Dun at the instance of the Government of Burma for the production of different grades of mangrove tannin extracts are in progress and efforts are being made to put them in the European market. In this connection, however, it must be remembered that until the Indian mangrove extract becomes well known among tanners it is not likely to fetch its full commercial value. Its introduction in the market can only be affected, therefore, by the aid of capable and influential agents.

VIII. COMBRETACEÆ.—

Next to the mangrove family, the various species of *Terminalia* deserve a short description.

Terminalia Chebula.—This tree is distributed in many parts of India and Burma. The fruits known as *harra* are collected largely in C. P. both in the Government and malguzari forests, and exported to Europe. Dr. Leather gives the following results of his analyses of four different samples :—

	Extract %	Tannin
Madras	57-87	38-67
Bombay	59-47	40-80
United Provinces	59-47	43-74
Central Provinces	...	31-00

The fruits are now mostly exported as they are, but with suitable appliances, very good pale-coloured extracts can be made thus increasing many times the present price

of this raw material. It is a matter of some satisfaction that one tannin factory at Raneegunj is already turning out marketable extracts of these fruits. Similar concerns should be started in different parts of the country on the same lines.

Mr. Hooper makes a valuable suggestion that even the bark of this tree can form quite as good a tanning agent as the fruits. This will be apparent from his following analyses :—

	Extract%	Tannin%
Bark from young tree	45.8	34.9
do from mature tree	35.7	33.0
do do old tree	31.2	27.5

Terminalia oliveri, BRANDIS.—According to Professor Procter the bark of this tree known as *than* in Burma contains 31% of tannin while its leaves show about 15%. An extract made from the bark as examined at the Imperial Institute, London, gave 68% of tannin. The writer has also found this material to yield an excellent extract, and the latter *may find ready a sale* in Europe at remunerative prices, if the supply is adequate.

Terminalia tomentosa, BEDD.—The bark of this tree has been on different occasions tried for experimental extract making. It may be regarded to be quite as good as the *sal* bark. It is reported to impart an objectionable dark colour to the leather, which can be eliminated when it is extracted on a large scale.

IX. MYRICACEÆ.—

Myrica Nagi, THUN.—The bark of this tree known as *kaiphal* in Hindi, has 27% tannin in it according to the analysis of Professor Procter. With such a high percentage of tannin in the bark, it will be an excellent material for extract manufacture provided the supply requisite for the purpose may be forthcoming.

X. CUPULIFERÆ.—

Of the *Quercus* species, Professor Trimble examined four samples of oak bark from India with the following results :—

	Tanning on dry bark.
<i>Q. Glauca</i> , Thunb.	12.20
<i>Q. Dilatata</i> , Lindel.	7.94
<i>Q. Incana</i> Roxb.	23.36
<i>Q. Semecarpifolia</i> Sm.	8.60

The tannin in these four barks is said to be identical with that of British and American oaks.

XI. CONIFERÆ.—

Pinus longifolia, ROXB.—The bark of Chir pine is used in various hills of India for tanning purposes. The percentage of tannin in the bark is about 13. As pine-bark extract is used in Europe together with chestnut and quercacho extract, it will not be a bad idea to mix chir pine bark with other heavy coloured materials for making mixed extracts.

From the description of the various Indian tanning materials given above, a fairly correct idea can be formed as to the tannin resources of India and as to the extent this country may take in supplying the tannin extract demand of the world. It will be seen that many of these materials compare very favourably with the raw materials of Europe and America in the percentage of tannin, and in most cases our materials are much richer. When the European capitalist thinks it worth while to extract woods and barks containing 3-4% of tannin, there is no reason why the pioneer manufacturers of India should not be able to develop a well-organised and flourishing tannin extract industry in this country with great profit to themselves and to the people. Only proper organisation and a fair amount of enterprise are required in this direction, and difficulties in the supply of raw materials will probably be overcome since the Government is always ready to extend

careful and sympathetic consideration to the development of this important industry.

Capital required for starting an Extract Factory.

The following estimate of a model extract factory has been based on the calculations of Messrs. Dumsney and Noyer, the eminent chemical engineers of France for a factory with the necessary plant and equipment capable of treating in 24 hours 60 tons of oak or chestnut woods in Europe or Acacia catechu, pyinkado and other woods similar in their tannin composition to the European tanning woods. A factory of this capacity is regarded by them as an ideal industrial remunerative concern.

<i>Items of Extraction Plant.</i>		PRICE.
		Rs. A. P.
I.	Battery of 16 wooden vats (capacity 4400 gallons each)	39,000-0-0
II.	Two cutters with angular boss, capable of reducing 30 metric tons of wood into chips in 12 hours	4,700-0-0
III.	Two elevators and one conveyer ...	3,000-0-0
IV.	Steam engine 50—70 H. P.	7,200-0-0
V.	Boilers, 120 sq. ft. heating surface ..	18,000-0-0
VI.	Two gas generating furnaces	3,600-0-0
VII.	Triple effect evaporating plant (capacity 770 gallons evaporated per hour)	48,000-0-0
VIII.	Four decanting turbines with an output of 220 gallons. (Rebatl, Buffand and Co's system	9,600-0-0
IX.	Factory buildings, (including shed, stores).	27,000-0-0
X.	Site for the building with a water supply of 11,000 gallons per hour ...	7,200-0-0
XI.	Water works	4,800-0-0
XII.	Five Refrigerators	4,800-0-0
XIII.	Vats for liquors	2,400-0-0

XIV.	Office and laboratory...	...	...	1,200-0-0
XV.	Noyer's*condensor--re-heater reservoir			2,400-0-0
XVI.	Shafting and pullies ..	...	...	1,200-0-0
XVII.	Wood in shade	...	...	12,000-0-0
XVIII.	Incidentals for casks, weighing machines and equipment	...	..	2,400-0-0
	Total	...		1,98,000-0-0

Add to this a working capital of 12,000 rupees. Thus for producing a minimum of 13 metric tons of extract in 24 hours, the total capital required would appear to be Rs. 2,10,000.

From an estimate of the cost of production and the sale price realised per 2 cwts. of chestnut wood extract Messrs. Dumsny and Noyer give a net profit of 2 s., 4-8 d. per two cwts. of 25° B. extract, and hence taking the working year of three hundred days with a 60 ton factory they calculate a gross profit of 30-33 % on the total outlay. It should be noted here that when this profit is yielded by the treatment of chestnut wood with 7-10 % of tannin content under European conditions of highly paid labour, there is every reason to believe that a factory working under the cheaper labour conditions of India would yield a still greater margin of profit.

The estimate given in the above paragraph is for a model factory for the extraction of tanning woods. But materials like myrobolan, mangrove and acacia barks can be extracted with profit even on a much smaller scale, though it goes without saying that larger the scale of operations, the smaller is always the cost of production. With a capital expenditure of Rs. 50,000 on the plant, an extract factory can be started which should be able to turn out a minimum of 1 ton of finished extract per day. A rough calculation of the probable cost of production and sale of one hundred weight of mangrove extract may be given here as an example. The cost of the production

of 1 cwt. of mangrove extract containing 60 % of tannin, will, under suitable conditions, amount to Rs. 6 while the sale price in England is 15-20 s. per cwt. (or about Rs. 10—15 at the factory in India or Burma,) thus the average gross profit per cwt. works out to about Rs. 5.

Adding another Rs. 50,000-for site buildings and working capital, it may be said that with this investment, 300 tons of mangrove extract can be manufactured in a year of 300 working days. The cost of manufacture calculated on the price of bark including establishment and other charges amounts to Rs. 36,000 while the market value would at the rate of Rs. 200 a ton be a sum of Rs. 60,000 thus giving Rs. 24,000 gross profit per year.

In conclusion it may be mentioned that the Forest Research Institute at Dehra-Dun has been examining some of the tannin extracts and any information that it possesses is at the disposal of the trade or of interested parties.

THE PROGRESS OF THE CO-OPERATIVE CREDIT MOVEMENT IN INDIA.

BY PROFESSOR JOGINDRANATH SAMADDAR,
Hazaribagh (Bengal).

General progress—Last year, the Hon'ble Mr. Carlyle, C. I. E. who presided at the Conference of the Registrars of Co-operative Credit Societies of all-India, remarked that though "little impression had been made on the enormous burden of agricultural indebtedness in India, still a stage had been reached at which serious work was being done and satisfactory progress being made." In welcoming this year not only the Registrars of all Provinces and States where Co-operative work is going on but also a considerable number of non-official gentlemen, he referred to the progress which was all the more satisfactory because the

annual reports show that in most provinces the aim of the registrars had been rather to foster growth where the seeds of co-operation had already taken root than to attempt to break new ground. Exactly so. The foundation should be adamant if we want to build our Valhalla. It is also satisfactory to note in this connection that public sympathy and enthusiasm have been created for whereas State aid accounted for only Rs. 686,143 of the working capital or very little more than last year (Rs. 651,816), loans from private persons totalled nearly 25 lakhs of rupees against less than 12½ lakhs at the end of June, 1908.

Looking this from another point of view, we should say that if Government assistance is not kept within moderate limits, the whole movement would tend to become departmentalized thereby frustrating the whole object for which it has been started.

General statement regarding the number of Societies, their number of members and their capital :—

Number of Societies.	30th June 1908.	30th June 1909.
Central ...	7	15
Urban ...	149	227
Rural ...	1,201	1,766
Number of members	1,49,160	1,84,889

Capital.

Loans from private persons	Rs. 12,43,495	24,93,814
Loans from other Societies	„ 5,84,765	15,96,611
Share Capital	„ 9,35,928	14,77,254
Deposits by members	„ 9,19,523	16,18,018
State aid	„ 6,51,856	6,86,143
Reserve	„ 78,559	1,93,271
Total	„ 44,14,086	80,65,111

Expenditure.

Loans repaid	Rs. 4,01,976	14,10,323
Loans issued	„ 36,93,018	59,99,924
Purchase of materials, etc.	„ 3,90,655	6,74,383
Profits	„ 1,80,916	3,26,265
Total	„ 46,66,565	84,10,895

Let us now have another comparative statement. In the case of *Central Societies* whose chief function is to lend to other Societies only, we see that last year we had seven Societies only. This year we have got 15, the number of members last year was 241 while we have this year 1194. The great feature is the increase in the working capital which has increased four times more.

Last year we had 2,35,555 and odd and this year we have rupees 10,07,100 and odd. A marked progress.

In the case of *Urban Societies*, there were 158 Societies last year, this year the figure stands at 227, the number of members has increased from 56,899 to 66,544 while the working capital which was last year Rs. 22,75,695 has gone up to Rs. 32,73,864.

In the case of *Rural Societies* we have 1,766 Societies this year as against 1,219, we had last year 93,972 members and we have now 22,39,123 and the capital stands at Rs. 40,86,754 as against Rs. 22,39,123.

Particular statement showing the progress of each class of Societies.

CENTRAL.

Of the 15 Societies we have 3 in Madras, 2 in Bengal, 3 in the United Provinces, one in the Punjab, one in Burma and 5 in Central Provinces.

The receipts amount to Rs. 14,25,937 odd including the opening balance of Rs. 12,108, and which are as follows :—

Share payments 72,625, entrance fees 1,306, deposits by members 3,77,356, advanced by Government 53,000, advanced by other Societies 1,14,499, advanced by private persons 333,312, loans repaid by members 19,003, loans repaid by other Societies 284,885, interest received 31,958 and sale-proceeds of stock 26.

The expenses are as follows :—Deposits withdrawn 1,19,881; loans repaid to Government 6,461, to other Societies 14,052, to non-members 54,998, loans to members 31,315, loans to the Societies 10,10,637, interest paid on loans 12,201, dividends, &c. 2,268, stock bought 332, and other

minor items totalling altogether 13,75,425 leaves the closing balance of 50, 511.

URBAN.

Of these, Madras has 24, Bombay 41, Bengal 29, United Provinces 49, Punjab 4, Burma 18, E. B. and Assam 27, Central Provinces 8 and Mysore 17.

The receipt including the opening balance of Rs. 2,14,950 stands at 65,70,474, the main items being share payments 290,650 ; entrance fees 5,996, deposits by members 6,71,427 ;

Government loans amount to 64,041 while other persons have advanced 18,18,623. Members repaid 16,90,633, the interest received amounts to 2,39,634, of the disbursements which amount in all to 62,99,458, leaving a closing balance of 2,71,015, the main items are loans to members 22,12,560, dividends paid 35,000, interest paid on loans and deposit 90,632.

RURAL SOCIETIES.

Of the Rural Societies we have 153 in Madras, 122 in Bombay, 364 in Bengal, 317 in United Provinces, 311 in the Punjab, 155 in Burma, 204 in E. B. and Assam, Central Provinces and Berar 87, Coorg 15, Ajmer 8 and Mysore 27.

The receipts including last year's balance amount to 53,86,994 and the principal items of interest are share payments 2,38,621, Government advanced 1,84,639 while private Societies and individuals advanced 20,23,689. The amount of interest received is 2,70,456.

Of the expenses, Government has been paid off 61,577, other Societies' debts have been cleared off to the amount of 7,12,470, members have got as advance 37,56,048 ; the sum of 11,280 has been paid off as dividends. The total amounts 50,31,973 leaving the closing balance at 3,55,021. In the profit and loss account we have all plus. In the Central we have 14,416, in the Urban 1,28,542 and in the Rural 1,83,302.

The most noticeable feature is the increasing interest which is being shown to Rural Societies and the deposits made in them by their members. This is indeed a very hopeful sign.

THE DEVELOPMENT OF GLASS MAKING IN INDIA.

By ALAKH DHARI, ESQ.,

Secretary, Upper India Glass Works, Ambala City.

According to Pliny and other classical writers of Europe there was a tradition among the ancients that the best glass in the world was manufactured in India. There hardly appears any reason to doubt the veracity of this statement, for the various materials from which good glass is made have existed here in abundance from time immemorial. Indian sands afford as fine and pure a silicic basis for glass as you can get anywhere else in the wide world. It is not, of course, implied that every variety of sand found in India is pure and suitable for making good glass. The sands of Ganges and Jamna beds, for instance, are peculiarly unfit for the manufacture of glass of superior qualities but good and sufficiently pure deposits of sand, and of sandstones, are met with in many places. We have beautiful varieties of lime-stones, too, in this country and whether in point of purity from iron and magnesia, the two admixtures that greatly affect the colors of glass, or with regard to the possession of superior calcareous properties, Indian lime-stones are second to none in the world.

In respect of the alkaline sources, it is a well-known fact that the commercial soda-ash, which is now very largely used in glass manufacture, did not exist in its present readily usable form even in Europe till only a few decades back. The alkaline bases used in the wonderful specimens of old Egyptian glass must, therefore, have consisted of other substances. The real processes by which Indian people in olden times derived their alkaline salts have not, to my knowledge, been ascertained but if the base was potassic, then it may be mentioned that weeds and plants, whose ashes could, on lixiviation, produce beautiful potashes, have always grown here in great abundance. Sodium chloride mines, too, are extensive, though how far and in what manner they were used in connection with glass-making is now hard to say. A possible base for glass in ancient India may have

come from *Reh*, which nature has so bountifully bestowed in all parts of the country. True, *Reh* as now obtained often contains many substances which are considered impure. The glass that is manufactured from it is generally neither transparent nor even clear. The responsibility for these defects in transparentness, however, lies more in the crudeness and unscientific nature of methods of glass-making pursued at present in this country than so much in the quality of ingredients used. Experiments that have been made in recent times for the extraction of commercial soda-ash from *Reh* invariably showed satisfactory results, and, hard as it may appear to believe, it is not improbable that in ancient times they may have known some methods whereby sodium carbonate of tolerably pure quality could be extracted from *Reh*. No analytical tests have, to my knowledge, been made of the specimens of ancient Indian glass discovered in present times and it cannot, therefore, be said with any approximation to certainty whether the alkaline base of glass in olden India was largely potassic or sodaic. But one thing is certain and it is that the materials from which glass was made in old India must have been used in pure and refined conditions, otherwise our ancestors could never have obtained glasses of such superior qualities as are handed down to us.

It is difficult to ascertain in what directions the industry of glass-making flourished in ancient India, but it did not, certainly, cover as wide a range of articles as are made of glass at present. The extension of glass to so many different articles of drawing-room and dining-hall luxury, as also the requisites of the scientist's laboratory and, above all, to its beneficent aspect of succouring old age with subsidiary sight was not, in all probability, dreamed of in olden times. The principal uses to which glass seems to have been put in early ages was the manufacture of beads and artificial gems. Later on, vases and vessels for holding liquid substances (ill-shaped bottles) were made and its use subsequently spread to other articles. Talking of beads and gems, I am reminded of the fact that the use of lead salts as a component part in making glass must also have been known to ancient

Indians, otherwise the brilliancy and fire of the old flint-glass articles cannot satisfactorily be accounted for.

As for colouring materials, we know that iron and copper, used for the purpose, have not only always existed in India in abundant quantities but the fact of their existence and utility, also, was known to ancient Indians, though possibly they may have profited by them in a considerably restricted measure. These two common metals appropriate within their fold the colour recipe for quite half-a-dozen important and the more popular hues in glass and there are, fortunately, evidences to show that both of these substances were actually made use of by glass-makers in olden times. Apart from this, our present methods of imparting various colours to glass have themselves undergone radical modifications of late and still need constant re-adjustments. New theories continue to spring up and frequently require a re-casting of older notions. We cannot, under the circumstances, express any decided opinion as to the limitations of our ancestors in regard to the production of glass of this or that color, particularly when it is now discovered that it is not inorganic materials alone which a glass maker employs in his colouring recipe, but common vegetable salts can serve a somewhat equally useful purpose in this connection. The use of vegetable salts has been known in India since remotely antiques times.

Saltpetre, another reducing agent that is used in glass-making for the purposes of refining and toning the appearance of glass, has always been available in abundant quantities in India and its use has been quite familiar among Indian glass-makers.

Latter day Indians have not, unfortunately, been able to devote any attention towards the investigation of either the scope and extent of glass-making industry in ancient India or the period of its antiquity in this country. Our political struggles during the last ten centuries and more have, no doubt, been a principal cause of the negligence of this and similar others fields of industrial activity ; this prolonged hiatus has, besides, in a great measure cut us off

Glass in Egypt,
Phoenicia, Greece
and Rome.

from our past and made us forgetful of its glories and prosperity.

The explorations made by Western antiquarians in connection with glass have for the most part been confined, besides the European countries, to the northern tracts of Asia and Africa, and according to them, it is from Egypt that the earliest specimens of glass come. From inscriptions and other surrounding circumstances, it is believed that glass-making can be traced in Egypt, with fair precision, to about 2,000 years B. C. and if we include substances much similar in appearance, and probably in chemical composition as well, to glass, the records are traced back to a far remoter date. For instance, there are found among ancient Egyptian ruins beads of rock-crystal that have over them a coating of turquoise blue transparent glaze, formed, in alllikelihood, of a silicate of soda and copper and supposed to be connected with the times of the first dynasty which ruled in Egypt about 5,000 B. C. From Egypt the art of glass-making was, it is imagined, learnt by the Phoenicians, who were then a self-governing nation inhabiting Western Asia somewhere over the tract of country now known as Syria on the eastern coast of the Mediterranean sea. Phoenicians were greatly noted for their learning and intelligence and the specimens of their glass articles now unearthed indicate that the art of glass-making had attained considerable perfection among them. A Phoenician vase exhibited in the British Museum, though not of very well-formed shape, which may probably be due to an individual lack of skill in its making is said to be of a perfectly white and almost transparent glass and, from inscriptive traces, its age may be fixed in the seventh century B. C.

When the development of Phoenician commerce and the consequent rise of their wealth turned their heads to voluptuousness and the Phoenician government became weak, the country was pounced upon and subjugated by a powerful nation from north, known as the Assyrians, and the art of glass-making then found its way through these people to southern parts of Europe. In the epistles of John, the apostle, given in the *New Testament* we find passages indicating the exis-

tence of glass among Corinthians and other tribes. In chapter IV, verse 6, book of *Revelation* there occurs a passage reading "a sea of glass like unto crystal" erected before the throne of God, and it is believed that this refers to a large mirror of glass. In chapter XXI, of the same book, mention is made of the expressions "clear glass" and "transparent glass" and it is, therefore, certain that the Greeks knew about the manufacture (or, at least, the use) of glass 2,000 years ago. From Greece this art was learnt by Romans. It is in the Roman period that the industry of glass-making first attained to importance. In pre-Roman times, glass is supposed to have been made on a very small scale and the knowledge of its manufacture, too, was confined to only a few people. But in the days of Roman ascendancy, this industry greatly expanded and became known in Spain, France and Britain. There is scarcely any application of glass known in Europe right up to the close of eighteenth century that was not discovered or learnt by the Romans, who are considered to have also been expert in the various processes by which glass is stained and decorated. The use of blow-pipe, which in our times has attained to such perfection and has enabled glass to be formed into so many different articles of every day use and comfort, was also first discovered by the Romans. Later history of glass in Europe is easily traced.

Coming towards the Eastern countries we are met with great difficulties in the matter of obtaining definite and connected historical data concerning this industry in ancient times. Early glass in India and other Eastern countries. The evidences now available, though at times of a tolerably reliable character, are most fragmentary.

Mrs. Rivett Carnac in her *Journal of Indian Art* gives a description of some glass beads exhibited in the 'Gallery of Religions' section of the British Museum. These beads which "were found chiefly in the neighbourhood of Benares and Cawnpore are associated for the most part with Budhistic remains of the period of Gupta dynasty, which reigned in Northern India shortly before the Christian era." "Of great interest" continues the description "are the spindle shaped beads, decorated with intersecting lines of enamel-

black, grey or white, on a ground of quartz, or sometimes of cornelian." A noteworthy feature about the specimens of ancient Indian glass unearthed in recent times is the masterful knowledge of the art of glass-making that they in unmistakable terms display. As no analytical tests of early Indian glass have been made, their precise chemical composition is difficult to determine but that the science of chemistry had attained considerable advancement in old India cannot now, I think, be gainsaid after the profound investigations made in this respect, and the incontrovertible proofs placed before the world, by that eminent scholar, Dr. Profulla Chandra Ray, Professor of Chemistry in the Presidency College, Calcutta. His monumental work on the Hindu Chemistry, may now be regarded to lay perfectly at rest the doubts heretofore entertained in regard to progress of the science of chemistry among the ancient Hindus and would remain a standing triumph of our old system.

The Chinese people carried on extensive trade with Northern parts of India in early centuries of the Christian era. Budhistic religion was beginning to spread about this time in Tibet and southern slopes of China and the people of those countries came to India in large numbers on pilgrimage and trade and freely mixed with Indians. The superior civilisation of ancient India was a great incentive for attracting Chinese to Hindustan and it is not at all unlikely that the Chinese learnt their first lessons in glass-making from the Indians and subsequently established this industry in their own country. Dr. Bushell, who took great interest in Chinese art, thinks that there is corroborative evidence that in the fifth century A. D. the art of glass-making reached North China from Indo-Scythia by way of Chinese Turkistan. In China, however, glass-making soon took a firm hold. Chinese pottery-glazing, it is admitted on all hands, is a very old industry and excellent enamels on metals are traced back to very early periods. The modern Chinese glass, too, is deserving of attentive examination particularly from manufacturer's point of view as the colors are often singularly fine and harmonious. From China the knowledge of glass-making is supposed to have spread to Japan. In some of the

Japanese tombs of the sixth and seventh centuries of the Christian era jars of glass have been found. Beads of clear glass, both blue and white, have been discovered in the dolmen tombs of even earlier times. In the grave of Emperor Nin-tokun who is said to have flourished in the 5th century, fragments of blue and white glass have been found.

The following account of another evidence of the existence of glass in ancient Japan was published in the *Athenæum* of the 7th August, 1875.

We extract the following from a letter dated at Yokohama, 25th of May, 1875 : " At Nara, an old capital of the Mikados, where seven of the descendants of the Sun reigned in the eighth century, is an immense wooden barn built by one of the kings, and where he placed all the treasures of his palace previous to the removal of the government to Kiyoto, where it has been ever since. This barn has been carefully repaired every sixty or sixty-one years and is now entire and sound. The treasures have been from time to time inspected, and some additions have been made to those which are found in the original catalogue. I observed an ewer of white glass, about a foot high, which looked more modern than the eighth century. We were assured, however, by an antiquary who is engaged in describing the collection, that this ewer is one of the objects entered in the original list or catalogue which was deposited from the first."

Apparently the same object is somewhat differently described by a writer in the *Pall Mall Gazette* of the 7th August, 1875. He writes of it as " a handsome glass vase with a coloured glass cover."

In Ceylon, we find records of mirrors of glittering glass being carried in procession about the fourth century B. C. and mention is also made of festoons and beads resembling gems, and very probably made of glass. About the same period "windows with ornaments like jewels which were as bright as eyes" were also in use and it is inferred from this description that small flat pieces of glass, coloured or white, were fixed into frames of stone, generally marble, so perforated as to form patterns. Windows of this type were very popular in ancient India and were greatly used in Europe as well.

Admiral Fitzroy has stated that in Ceylon, India and probably other oriental countries as well, a system was prevalent from immemorial times of placing lumps of glass

on the pinnacles or other high points of buildings to avert lightning and from this it would readily be seen that the use of glass as a non-conductor of electricity was known among the Hindus long ago. Lumps of glass on the tops of their residential buildings and temples, evidently as a protection against lightning, are often found in the older Indian ruins. There is a description in the famous history of the Singhalese kings, *Mahavanso*, of a similar practice prevalent in Ceylon in the third century B. C. It runs thus—"Having placed a large gem on the top, he fixed below it for the purpose of averting lightning a *vajra chumbala* like a ring" Turner, who translated the history has rendered the word *vajra* as 'glass'. Doubt has been expressed by some as to whether it may not mean a loadstone or an iron magnet. However this may be, these passages and similar other references elsewhere in the Singhalese literature afford, at least, a ground for confirmation of the belief that use of glass in India and Ceylon has been much earlier in date and more important in practice than is usually supposed by European writers and that glass-making may safely be regarded as old, if not older still, than what is supposed in respect of the Western Asiatic countries.

In Pliny's memorable work on *Natural History* (which even in his own life time was considered of such great merit and extraordinary value, and so great was the opinion among his contemporaries of Pliny's erudition and abilities that a person named Lartius Lutinius offered to buy his notes and observations for an enormous sum of about £3,242 or about 50,000 rupees, but which Pliny refused) mention is made of Indian glass being the finest in the world and made from crystal quartz. Dr. Birdwood of the Indian museum, has, however, suggested that the Indian glass which Pliny mentions in his works might probably have been Chinese, and though it could be admitted that in those early periods, when so little was known about eastern countries in Europe, articles of Chinese origin might, in Rome, be easily passed off (and be known as) Indian, there does not appear to be any plausible reason to give credence to such a theory, particularly when other reliable evidences indicating the existence

of glass in India in those early times are not wanting and the Chinese themselves are believed to have acquired the first knowledge of glass-making from India. Pliny is, besides, considered a most successful administrator and a profound historian of his times. He served first as a Governor in Rome and then in Spain and had all the means, then available, of coming into personal contact with men of all parts of the world. In his books, Pliny has treated of a very extensive and varied range of subjects, such as minerals and flowers and plants of the world; there are accounts of animals, birds fishes and beasts; of winds, rains and hails; geographical description of all the different places on the globe (as was then known to Romans) and a history of every art and science, of commerce and navigation, with their raise, progress and several improvements. Pliny's descriptions of his contemporaneous period are generally regarded to be most authoritative and correct narratives extant. It would, therefore, appear necessary that before we set aside or disbelieve Pliny's remarks regarding Indian glass and ascribe his descriptions of Indian glass as pertaining in reality to glass of the Chinese origin, as suggested by Dr. Birdwood, the matter should be further carefully investigated.

There is mention in William Nesbitt's treatise on glass of some ancient findings in India. We read there "In the tope at Mankyala, in the Punjab, opened by General Cunningham, which appears to date from about the Christian era, was found a glass stoppered vessel and similar vessels or fragments have been discovered in other topes of a later date." There are fragments of glass preserved in the British museum about which it is declared that they were excavated in the ancient ruins of Brahminabad. As, however, these specimens somewhat resemble in character the glass manufactured in Rome in the second or third century A.D., it is not unreasonably inferred that extensive trade relations must have subsisted between India and Roman empire in those periods and either these pieces of glass found their way to India from Rome, or what is still more likely and supported by other evidences as well that the people of ancient India freely travelled to Rome and, observing new fashions there,

readily copied them in the already existing factories of our own land.

The theory about the existence of intimate relations between Indians and foreigners in the early centuries of the Christian era is corroborated by the famous traveller and geographer, Strabo, in his accounts of the *Indika of Magasthenes*. According to him, large towns in India had committees (consisting of some members of town municipal corporations) specially entrusted with the important duty of taking care and helping foreign residents. None of the humiliations and ill-treatments now meted out to Indian immigrants in South Africa and other British Colonies were ever practised in India. Every attention was, on the contrary, shown to foreign traders and visitors, of whom, about this time, the Romans formed the largest contingent from Europe. Proper arrangements were made to "entertain strangers, assign them lodgings and observe their modes of life and escort them out of the country, or send home their property, take care of them in sickness, and when they die, bury them."

The forces of disintegration and decay set in right earnest among the Hindu kingdoms in India shortly after the beginning of the Christian era and from that time onwards the History of India is, for a long number of centuries, a lengthy chapter of sad accounts of the decline of Hindu powers, relieved here and there by valorous and noble efforts of a few lofty souls or some small brave community to set back the rushing tides of dissolution by means of internecine dissensions and consequent dismemberment. In the vandalism that accompanied these warfares, all the old literature and works of fine-art that could be laid hand on were ruthlessly destroyed.

Pieces of glass connected with the seventeenth century are, however, commonly met with. There are, for instance, the small panes of glass noticeable in the panels of the central inner gate of the Taj Mahal (Agra), which was built about the middle of the seventeenth century. An enamelled glass of considerable beauty is preserved to this day in the Indian section of the South Kensington Museum. This is a washing basin with a spreading mouth, some eleven

inches in diameter, exquisitely inscribed with white flowers on red ground, the color of glass itself is milk white. There are exhibited in the same Museum two Indian *hukka*-bases of engraved white glass, which denote considerable skill and a perfect mastery of the process of manufacture coupled with high workmanship in polishing and engraving. Some fine vases of thin white glass (believed to be manufactured in Northern India) may also be seen here. In the case of many of these vessels, the clear and transparent crystal is still unchanged. All these specimens are supposed to belong to the 17th century. Marryat collected a remarkable series of little flasks, painted with figures and flowers and these are also displayed in the Indian Department of the Museum. Sir John Hawkins in his description of the treasures of Emperor Jehangir, in 1608, mentions that "of rich glasses.....there be two hundred."

Mr. Forrest, who was some time ago a Director of Records at the India Office in London, is said to have obtained a collection of small glass vessels from the Kaira district in Gujarat (Bombay Presidency). Among these there are "some graceful little cruet-shaped ewers of a pale pinkish glass, the colour believed to have been obtained from gold, and also some glass-lamps of rounded conical form similar to those used of old in Egypt." There is also a most remarkable collection of contemporaneous Indian glass articles, manufactured at Patna and Hoshiarpore, in the British Museum. "The principal charm of this native Indian glass" writes Mr. Edward Dillon in his excellent and valuable book on *Glass* "arises from the violent contrast that it affords to the impeccable *cristallo* and to the flint glass that have tyrannised over us so long in Europe. It is at length beginning to dawn upon us that there are other qualities than absolute transparency and absence of colour to be looked-for in our material and it is the attempt to bring these qualities into prominence that has led to the development in France within the last few years of quite a new treatment of glass."

The manufacture of glass bangles in India is a pretty

old industry and during the last 300 years it has steadily grown into importance. Throughout the Moghul period we find that glass *churies* were freely worn. They were at first made, in all probability, entirely from crude country glass and, even now, the bulk of *churies* are made from this substance. *Reh*, a material consisting of carbonates, sulphates and chlorides of sodium mixed with clay and sand in varying proportions is fused by the application of heat and is formed into a coarse quality of glass, half-white and half-green in color, the latter tinge being evidently due to presence of iron in it. When fusing *reh*, salt-petre is sometimes added in small quantities, as also the colouring materials, viz., cobalt for blue color and a mixture of iron and copper for green. The furnaces in which this country glass is prepared are made from ordinary red bricks. The structure is common and consists of a somewhat deep hollow space covered with a semi-circular dome having, about the middle of its girth, small holes in various parts for the escape of smoke and a bigger one at one end for firing purposes. Dried *arhar*, *bajra* and indigo stalks as well as all kinds of firewoods are used as fuel and a smelting lasts from 2 or 3 to 10, or even more days according to the quantity of raw materials put in, of which there is generally from 50 to 800 maunds.

The business in Indian glass bangles is carried on largely by small capitalists. They have usually received very little education and could hardly be expected to keep themselves abreast of times in matters of fashion and methods of their work. Yet, the improvements which *churie*-making industry has made in this country of late years is quite remarkable. The old, small, 4-hole, ill-fired furnaces are now rapidly giving way to larger ones, having as many as 18 working holes in each, and developing considerably higher melting points at a proportionately lesser expenditure of fuel. In regard to glass-bangles themselves, it is refreshing to find that numerous new and beautiful varieties of patterns have recently been introduced, in particular in Ferozabad and its neighbourhood. The trade is not only brisk but the better qualities of local products are, in many ways, now quite capable of holding their own against the

imported products of Austria, both in point of general finish as also of ornamental skill.

There are, however, still many serious defects in the old-model glass furnaces. They cannot, for instance, burn coal though the little changes required in the fire-places in order to admit of coal being also used could readily be effected at a trifle extra cost. Improvement is also possible in the methods of regulating the passage of air in the furnaces in order to permit of higher temperatures being attained and heat preserved from being wasted through excessive draught. Harder glasses, too, could then be easily melted in these furnaces. Then annealing arrangements are primitive and unsatisfactory but the necessary improvements in this respect, also, can be effected by little modifications in the designs of furnaces.

The manufacture of hollow (blown) glass is carried on in Najeebabad, Benares and Nagina in the United Provinces of Agra and Oudh and in some places in Bengal and Punjab as well. In Najeebabad, Benares and Nagina small phials for dispensing country medicines and larger flasks for keeping *araks*, Ganges water and *achars*, &c., are made and command good sale.

In Panipat and Benares the manufacture of tin mirrors for use in *arsis* and *Tikli* (worn on forehead) is also an old industry.

In the matter of contemporary glass I have hitherto dealt with the industry of the old school. During the last 25 or 30 years a new school of contemporary glass of the new school. has come into existence with the object of developing glass-making industry on Western lines by erection of smelting furnaces of the same designs and on similar principles as are in vogue in Europe. A start in this direction was made by the establishment of two glass factories in Bengal, one at Sodepore and the other in Titagarh. Experts were brought out from Europe and they constructed elaborate smelting furnaces on up-to date Western lines. Apparatuses making hollow glass-ware by means both of mouth and of mechanical blowing as well as by pressing machinery were imported, but owing, pro-

bably, to the inexperience of the promoters of these concerns with the requirements of glass industry and the equally deplorable ignorance of the foreign experts with local conditions, the factories had to be closed soon after their erection. The machinery and residual effects of both these concerns have since been purchased by the Gwalior Glass Works.

Undaunted by the difficulties that beset our brethren in Bengal, a joint-stock concern was floated in Ambala, City (Punjab) and another at Hyderabad but unfortunately, both these concerns, very soon after their inception, were compelled to wind-up their affairs. Though themselves compelled to cease operations, yet the energy and the interest which these ventures brought into existence could not remain idle. The glass expert whom the Ambala people had got out from Europe, a gentleman Mr. Augustus Callus by name finding himself stranded by the unexpected collapse of the local venture, began to knock at sympathetic doors and eventually succeeded in persuading two enterprising men of Lahore, Mr., now Sir, D. P. Mason and Mr. Oretal, to promote the establishment of a glass factory at Rajpur (Dehra Dun) as a joint-stock business. The factory worked well for 3 or 4 years but owing, it is said, to some defects in internal management, it had to close operations in 1908. It has since been purchased by Lalas Harkishen Lal, Mool Chand and Devi Ditta Mal, all of Lahore, and Mr. Har Prasad of Dehara-Dun, and they are re-starting the factory on a befitting scale.

The Ambala factory was sold by auction soon after the company that brought it into existence had gone into liquidation and it was, afterwards, purchased by Lala Panna Lal, an enterprising young Rais of Ambala, and resuscitated in 1903 and has since been working satisfactorily under the name and style of the Upper India Glass Works. In the Ambala Glass Works there are at present two large glass smelting furnaces, elaborate and modern in their design and construction, as also sundry blowing and pressing machinery. The Hyderabad glass-factory could not, unfortunately, be revived and its entire effects were, in 1907, purchased by the

aforesaid Lala Panna Lall and incorporated in the Ambala Glass Works. The manufacture of hollow glassware, by means of mouth blowing, was tried early both in Ambala and Rajpur factories but owing to the paucity of trained labour, and difficulties in managing the same, the work had to be temporarily abandoned. Efforts are now again made to recommence work, this time on a better and stabler basis.

A glass factory has already been working successfully in Madras for the last 3 or 4 years and I saw the other day an announcement of a new company being floated there with a capital of two lacs of rupees to start another factory.

A factory was started at Sikandra Rao, in the Aligarh district, but it had, unfortunately, soon to be closed. Two glass factories are now working in the small but flourishing town of Ferozabad, while others which are the result of purely indigenous skill and consist as it were, of old type furnaces with some new ideas embodied therein exist at Karehra, Bhadan, Jaswantnagar, Kalakanker and several other places in the United Provinces. The establishment of others at Panipat, Naini (Allahabad), Hardoi, Makhanpore (Agra) and Buxar is announced. Dewan Bahadur Bullabh Dass, of the pottery works fame, is starting a well equipped glass factory in Jubbulpore. I have also seen the prospectus of a glass-works proposed to be started in the Western presidency under the leading direction of the public-spirited citizen, the Hon'ble Mr. Gokuldas Kahandas Parekh of Bombay. A factory already exists in Talegaon, near Poona.

The development of glass-making as a cottage industry in his dominions is on the programme of commercial enterprises of that great friend of indigenous industries, Maharaja Sir Madho Rao Scindhia. A step in this direction has, indeed, already been taken by the starting of a factory in Morar (Gwalior), where extensive experiments have been carried on with local raw materials. The establishment of glass factories in his State is being seriously contemplated by His Highness the Maharaja of Alwar, and the Bikaner Durbar, too, has expressed its readiness to encourage private enterprise in glass industry in its territories. I had many times wondered why the progressive principality of Baroda

was lagging behind in this respect and' was sincerely glad to learn, the other day, that glass-making would soon be added to the many existing flourishing industries of that ideal State. And that land of busy gold-reefs, I mean the advanced Mysore, may, too, soon have the privilege of possessing some up-to date glass factories in its dominions. The deposits of sands and lime-stones in Narnaul and other tracts in the Patiala territories constitute very fine basis for glass-making and it is hoped that efforts will soon be made to work these out.

It should not be supposed that the fury which has been raging in India about the development of glass industry has spent its force in the mere establishment, or projection, of these few factories. Enterprising youths have crossed the sea to receive instruction in this industry in Japan, America and Europe and I believe there are quite two dozens of them learning ceramics and glass-making abroad at present. The good work done in this connection by the Association for the advancement of Scientific and Industrial Education (Calcutta) by sending regularly every year numbers of students to foreign countries for studying useful arts and industries deserve our great praise and I sincerely hope that my countrymen in other provinces, too, will soon realise their duties in this respect and start similar associations in all parts.

In order, however, to derive full advantage from the training received by our youths in foreign countries, it is necessary that students should first be admitted in some factory in India for a short course of apprenticeship and be given there a good grounding in the essential elements of this industry and made fully acquainted with the character and properties of raw materials available in the land and the manner of their present treatment in our factories, together with a practical demonstration of the defects of our older systems and the difficulties under which we labour. They will then be in a proper position to follow intelligently the processes of glass-manufacture pursued abroad and be also able to learn how best to adapt foreign methods to the exigencies of our own conditions,

If a student, for instance, has first received some regular instruction in the matter of structure and type of the native pattern smelting furnaces operating in India, he will not only readily understand the principles of their construction in a foreign country but will also be able to find out how to transplant all that is good and valuable in those systems in our own, without entirely casting aside that which is indigenous to us and imitating wholesale complicated foreign ideas in applying which many a slip could easily be made, causing, as often happens, trouble and unnecessary expense afterwards. Likewise, if he already knows in what forms the natural basis of silica and alkaline substances exist in India and how they are used at present, as also the character of difficulties presented in making good glass therefrom, he would devote much of his time towards the solution of these problems and with the facilities and expert advice, within his reach there, may be able to overcome them with comparative ease. That such observations are not unfounded or imaginary is indicated from the small measure of success attained by the majority of our foreign returned industrial experts who had received no technical training in the subject of their study before proceeding abroad.

By these remarks I do not for a moment wish it to be supposed that I seek to belittle the sacrifices and difficulties which these young men submitted themselves to during their sojourn in foreign countries or to detract in any the least degree from their usefulness and value to the country. Far from that, I am fully alive to the fact that they are all exercising a powerful influence in the matter of rejuvenating and improving the condition of our industries and our feelings of sincere affection and genuine good-will go with them in all their undertakings. It is, indeed, to these young people that we principally look for the development of the resources of our country in time to come. What I, however, wish to impress on my countrymen is that if an elementary training of the sort I have indicated above be imparted to these youths, the extent of their success would be much vaster and achieved at a highly rapid rate.

Glass made from a mixture of sand, alkali and lime without the addition of any colouring substance, is usually of a semi-white colour, the extent of clearness varying in proportion to the degree of purity present in the constituent bases. If, for instance, the silicic base contains iron in an appreciable quantity, the resultant colour of glass would be more green than white. In such cases manganese-dioxide is sometimes used as a decolorising agent. Considerable care is, however, necessary in removing the defects of colour by the aid of manganese, as even slight errors in treatment are apt to convert it from a decolorising agent into one producing different shades of pink and violet. When ordinary half-white bottle glass is required, there is practically no necessity to add further substance to the bases mentioned above.

The range of colours that are available to the modern glass-maker is practically unlimited, particularly as different colouring materials can be used in a great variety of combinations in order to produce mixed or intermediate tints. Cobalt is considered as one of the most powerful colourisers in glass-making and, if used in the form of a pure oxide, very small quantities of it are needed to give a bright blue tint to glass. Gold produces beautiful ruby colours while silver is largely used as a surface stain in order to yield bright yellow tints. Uranium also gives yellow colours in a much more characteristic and constant form. Copper is generally used as a component substance in a variety of colours from red and green to pinkish purple and blue. Manganese, when not used as a decoloriser, produces different shades of violet. Chromium, an intensely active substance, is used as a component colour for making green, but, owing to its high refractory properties, it is hard to completely dissolve and incorporate it with glass.

The art of imparting colours to glass is very subtle and difficult and much depends upon the skill and care of the glass-maker in accurately adjusting the degrees of heat and using materials in proper proportions.

The glass-making industry has a great future before it in India. To those interested in this line and desirous of forming some idea as to the extents of trade carried

on in glass articles, I subjoin a statement (in the form of an appendix) showing imports of this article from foreign countries during the years 1901—1907. This statement cannot, however, be regarded as a correct index as to the volume of future business, if glass-making develops as an Indian industry. A great deterring factor at present in the way of the expansion of glass trade is the high prices that are now charged for glass articles in Indian markets. The reasons are evident. A major portion of glass articles offered for sale in this country is imported from far-off countries and to the original prices have to be added, besides the profits of many firms through whose hands goods pass before reaching actual purchasers and consumers, sea-freight, customs dues, clearing charges and, in the case of inland towns, heavy railway freights. When this industry develops in India and my countrymen start, as it is hoped will soon be done, factories in all the various trading centres, and articles begin to be made from local materials, prices would get considerably reduced and the sales will, then, naturally mount-up high, and trade in glass will expand in manifold ways and gain in national importance.

In all countries, which are noted for their industrial advancement, there exist well-equipped laboratories, run on commercial lines where everybody can, on payment of a small fee, have specimens of any material analysed and ascertain its industrial uses. Services of consulting chemists, whose vocation it is to find out the nature of defects that may exist in any raw material, and give advice about the manners in which they can be remedied, are also readily available. In the development of all pre-eminently chemical industries, like glass-making, the existence of such facilities has great practical value. These facilities have been scarce here owing, partly, to want of adequate occupation for the few that already exist and, secondly, on account of our people having not yet learnt the ways of starting them and, others, of making extensive use of them. I know of only two such establishments in India, one of Dr. Schulton in Calcutta, and the other of Professor T. K. Gajjar in Girgaum, Bombay.

The services of both these firms have not yet, I am afraid, been availed of to any large extent by the Indian public. This indifference may, perhaps, be traced to these establishments lacking to some extent in that type of modern equipment and business instinct which would be a marked characteristic of a similar concern in the West, but if our people resort to these institutions more often, and in larger numbers, the wants of these concerns will begin to tell on them and would, in all probability, soon get remedied or the room thus found for such institutions will give rise to other better equipped establishments. It is, by the way, a matter of extreme regret that the efforts made in this direction in the Punjab by our gifted countryman, Mr. Puran Singh, soon after his return to India, after undergoing an extended course of higher scientific education abroad, did not bear any fruit.

A serious obstacle in the way of the rapid development of the new school of glass-making is the scarcity, or rather the absence, of a tolerably pure supply of indigenous alkaline base for making glass. If our scientists could succeed in devising some method whereby sodium chloride, which is so abundantly available in India, could be introduced into the glass-pot in its natural (*i. e.*, common salt) form, this great problem would soon be solved. As it is, the volatile character of the chloride at high melting points presents a serious difficulty for before the sodaic substance can combine with silicic and other ingredients, a great portion of salt disappears by vaporisation. This difficulty has been overcome in Europe by first depriving sodium or potassium chloride of its volatile character and for this purpose it is converted into a sulphate by the direct action of sulphuric acid. The resultant substance is rendered anhydrous in a reverberatory furnace and then calcined with a mixture of lime and coal forming a black coloured carbonate, which is afterwards lixiviated in a successive number of tanks in order to produce the commercial carbonate of soda. This method of treating salt is known as the famous 'Le Blanc' Process. Another treatment of salt, which is called the 'Ammonia Soda Process', consists of gaseous Ammonia being passed

into a solution of salt and water and played on by carbon dioxide until the solution is thoroughly saturated. The acid carbonate of soda, thus formed, is heated and turned into the carbonate of commerce. A number of bye-products are also obtained and as they have considerable commercial value in Europe, the cost of the main product is very much cheapened there.

For making cheaper qualities of glass, the alkaline base is sometimes introduced in the form of sodium-sulphate, which is obtained as a result of the first stage of operation in the 'Le Blanc Process', but as this substance cannot ordinarily be decomposed with silica alone, reducing agents in the shape of organic carbons are added. Apart from the common salt, the substances existing in enormous quantities in India and known as *reh* will also, if properly treated, yield beautiful alkaline bases for ordinary qualities of glass and the process of conversion would, I believe, be neither complicated nor difficult. An obstacle is, however, believed to be presented by the absence of uniformity, or rather constancy, of any fixed standard of chemical properties in the varieties of crude *reh* obtained in the market. No careful analyses have, to my knowledge, been made of samples of this substance and hence the nature of variations that usually exist in *reh* (obtained in different localities) cannot be precisely stated.

But if glass-making industry on modern lines is actually to develop in India on a large scale, the manufacture of sodium carbonate from Indian salt or *reh* should be undertaken at once and considering the predominant part which carbonate of soda plays in many important industries, and the incentive which its local manufacture and consequent cheapening of cost would give to them, our Government or some enterprising Indian prince may well take-up the question of the development of this branch of industry and start on their own account, some soda making works or subsidise soda-making industry on some substantial basis. .

In order to explain the extensive range of its uses I may mention that the carbonate of soda forms an essential constituent in the manufacture of soap and paper, in refining oils,

in spinning and weaving of cotton, in tanning and curing of leather and in the process of extracting aluminium from its ore, all important and growing industries. It reflects a great reproach on our country's industrial enterprise that such an important industry should be left undeveloped.

I would be failing in my duty were I to omit from mentioning here the sense of obligation that we all feel to the large number of our patriotic countrymen, who though not directly connected with or engaged in glass-making, have all the same, greatly helped us by their useful advice and ready assistance. The inspiring presence, for instance, of Mr. Beni Madhub Mukerjee of the Rurki Engineering College and the keen interest evinced by him in all that pertains to glass, merits special notice.

The valuable services that the Governments of Sir John Hewett in the United Provinces and of Sir Louis Dane in the Punjab are rendering to the improvement of indigenous industries and the industrial surveys organised by them and the particular regard paid to the development of glass-making in this connection, deserve our sincere appreciation. These efforts, again, are a phase of the wider policy of improving Indian industries that has been one of the marked characteristics of the whole system of British Government during recent years and for which we express our sense of deep gratitude and tender our best thanks to our rulers.

Statement showing imports of glass articles into India during the years 1901—1907.

APPENDIX.

Particulars.	1901-02		1902-03		1903-04		1904-05		1905-06		1906-07	
	Cwt.	Rs.	Cwt.	Rs.	Cwt.	Rs.	Cwt.	Rs.	Cwt.	Rs.	Cwt.	Rs.
Bangles ...	...	...	...	...	...	...	...	...	...	3,876,726	...	4,278,258
Beads and false pearls.	13639	1,416,299	14437	1,651,325	22245	2,025,646	24163	2,492,659	15707	1777,054	22520	2,402,442
Bottles ...	49016	5,28,116	69862	6,88,641	69605	6,42,445	70591	6,39,436	68696	6,23,055	65785	6,50,645
Common glass ...	32456		44332		47613		49036		45363		47782	
Lamp-ware...	...	...	...	...	...	...	...	...	...	5,51,687	...	694138
Sheet and plate ...	11454277	1,285,499	10032094	1,035,095	10676259	9,80,108	9540105	930,127	17301553	1651169	13769052	12448884
Otherware...	...	60,23,259	...	6,083,129	...	92,72,863	...	7,194,879	...	2,767,417	...	2,848,441
Total ...	...	9,263,270	...	...	...	9,920,752	...	1,1257,101	...	11,247,108	...	12114108

THOUGHTS ON THE CALCUTTA EXHIBITION OF 1906*

BY RAO BAHADUR GANESH VENKATESH JOSHI

Poona.

The forthcoming exhibition is the fifth of its kind in connection with, and under the auspices of the National Congress and it was here in the Metropolis of British India, that the fruitful idea was first conceived, and the first exhibition held in 1901. Ahmedabad, Bombay, Madras and Benares have since had their turns; and now the institution comes back to the home of its birth with added strength and vigour, and promises to give us this year a display of Indian arts and industries richer and grander by far than ever before. It has the support and patronage of the Government of India and His Excellency the Viceroy who has more than once expressed his hearty sympathy with the movement and its aims has kindly consented to open it in person.

The occasion is thus one of unique interest and importance and I submit, it behoves us to consider whether the time is not come for taking a forward step in the matter and initiating a new scheme of action with a view to increasing the usefulness of the institution.

Even as at present arranged, these exhibitions undoubtedly serve a most useful purpose. They help once in a year to gather up the scattered threads of the nation's industrial activity, and presenting in one panoramic view the results achieved, supply a standard by which to gauge the country's economic advance. They further convey an idea of the boundless wealth of national resources we possess, the low stage of development we have yet been able to reach, and the practically limitless range and scope that exist for fresh efforts. New lines of advance suggest themselves to the inquiring mind, and new vistas open up

*Though this Paper refers to the Exhibition of 1906, it contains many valuable and practical suggestions and hence it has been published here.

before it on all sides of possible development. From another point of view, these annual displays serve to popularise a knowledge of the country's products, promote a wider appreciation of their value and a more liberal patronage at the hands of the public. They also encourage on the part of the workers energetic efforts to reach higher levels of excellence.

These are all valuable results, but, to my thinking, the time has arrived when we may aim higher and inaugurate a new line of advance with a view to secure for the general industrial life of the country, a larger and fuller measure of advantage from these annual exhibitions than is at present attempted. Broadly speaking, the exhibitions are intended chiefly to *stimulate* on the one side the *expansion of trade* in Indian articles, and on the other *improvements* in production and manufacture, and *new extended developments*; and it seems desirable and necessary that the stimulus that thus comes from them in these two directions should not be a passing or a temporary, but a continuing and permanent stimulus—steady and vigorous, and operative over a wide and widening area of industrial effort, and on a carefully arranged plan so as to economise time, effort, and expense, &c.

In this connection, I would request reference to *Government of India Resolution No. 239 in the Department of Revenue and Agriculture, dated the (Calcutta) 14th March, 1883*, dealing with the subject of Museums and Exhibitions and sketching out in broad outline a plan of action the Government of India desired to be adopted in order that they might be made effectively to fulfil the purposes for which they were intended.

These purposes are :—

- (A) *Promotion of Trade* in Indian products ;
and
- (B) *Improvement of art* and other manufactures.

As regards *stimulus to Trade* :—

Government deem it desirable (1) that a permanent *sample collection of commercial products of each province* should be formed and continuously maintained at some central place within the province, (2) that one or more complete sample

collections of the commercial products of all provinces should be formed at the Presidency Towns which form the principal trading ports in India ; (3) that a full description of the uses to which each product can be put must be supplied; and (4) that some means should be taken at each exhibition of ascertaining the best way in which Indian products can be pushed into further notice in the commercial world.

The Museums—Local, Provincial and Imperial—should serve as Trade Museums each with a sample collection and a supply-room—only duplicate of the samples maintained—to be supplied to the public. These museums would further be useful in another way.

As it is, collections of exhibits for these exhibitions cost much time, trouble and expense. As soon as an exhibition is over these are usually sold, given away or otherwise disposed of. And on each fresh occasion, the collections are renewed. Such an arrangement obviously involves waste. If these exhibitions are to be held year after year, side by side with the annual sessions of the Congress, it would be desirable that the collections once made should be maintained to serve as a nucleus to which additions might be made from time to time as required and that a system of loans and supply should be arranged under which collections of exhibits could be made for exhibitions at the least expenditure of time, trouble and money.

There is already such a store of Indian articles formed at Calcutta in 1901. Only it requires enlargement, and reorganisation on the lines of a commercial museum. Similar stores should be formed at other provincial centres and it is necessary to have one Imperial or Art Indian Museum for the products of all the different provinces.

As regards descriptive catalogues or hand books relating to the more important of Indian products,—Dr. Watt's Dictionary of Economic Products is a most useful and comprehensive work of reference, and brief notes based on this might be prepared and published under the direction of the Exhibition Committee both in English and in the principal Vernaculars of the country.

Further, as to *inquiries regarding extensions of trade*—it would seem, they can best be conducted by the *ministry of Commerce and Industry*—in consultation with the mercantile community, and the results published for general information. Usually it is the business of exhibitors to make such enquiries ; but in the existing circumstances of the country Government recognises (para. 7) that “the duty of bringing a knowledge of the value of Indian products or manufactures before the commercial public initially devolves upon Government Officials.”

As regards *stimulus to improvement and new development*—the point may be considered with reference to

- (1) *Agriculture*
- (2) *Ordinary manufactures* and
- (3) *Art manufactures*

(1) *Agricultural products.*—

Much might be done at these exhibitions to get the farmers to appreciate the value of superior products and superior methods of production, and the use of superior implements and artificial and other manures, and supply them with useful information about agricultural points, cattle breeding, sheep rearing, fodders etc. Something also may be done to encourage trial cultivation of new products.

As regards *Forestry*, there is great ignorance ; and private plantations are on the decline. The exhibition of various kinds of *wood* and *timber*—and other *forest produce* gums, resins, tans, etc.—with a few good lectures arranged on the subject would awaken interest in a branch of industry at present utmost neglected. Cheap leaflets in the vernacular would be of use.

Pastures.—Wool is a pastoral product of great importance. We have 43 million heads of sheep and goats in India and yet there is little of wool or goat's hair that is of commercial value. The wool that we send out is imported wool—imported for the most part from Persia, Afghanistan etc. Useful information might be supplied to the villagers on these and other kindred points.

(2) *Ordinary manufactures.*—

We have as yet but few such of any importance—

excepting cotton and jute. Here the aim should be to stimulate new developments. Government is aware of this and proposes that "at the time of an exhibition some assistance can be given by collecting samples of *foreign manufactures*, by providing information as to the *method employed* in manufacturing them and by subsequently *conveying such information* to the *native manufacturers*."

I submit each year *one or two industries* might be *selected* in regard to which India possesses special advantages, but which at present do not exist or if they do, require improvement and development *e.g., sugar refining, oil pressing, glass making, paper manufacture, the making of chinaware &c.* And I would suggest the employment of specialists, whose duty it should be to visit the different provincial centres and disseminate a knowledge of these things among the people by means of lectures.

There is the largest scope for such an effort in regard to mining and minerals. The mineral production of India is increasing every year ; but the Indians have but little share in it. The minerals are usually among the exhibits at these exhibitions. But it is desirable to have mining machinery also shown. Lectures, too, on the subject say by such an accomplished mineralogist as Dr. P. N. Bose will be of the greatest value analogous to those arranged by the Agricultural Department. Cheap hand books are needed for popular use describing each mineral, its places of occurrence, and the uses to which it can be put. [Mr. Hadi, Assistant Director of Agriculture, United Provinces, it is understood, will be on special duty at the exhibition in connection with sugar refining. May he not be invited to visit the other provincial centres and arrange a course of like demonstrations and trials? So, also, it may be suggested that Mr. P. N. Dutt, Deputy Superintendent, Government Survey of India might be invited to undertake a similar function in regard to mining in India].

(3) *Art manufacture.*—

These manufactures are the glory and pride of the country. Here is this field of artistic work—whether it is silver filigree work or enamelled work, carved ivory or

wood and stone carving—we have no formidable competition to face, and yet for want of a sufficient demand for such articles our arts are declining. Government is most anxious that some vigorous effort may be made to revive and develop them. In the resolution above quoted, this branch of the subject receives special consideration.

Government proposes :—

(1) The formation of *Local Museums* at places of art manufacture and

(2) The organisation of local committees composed of officials and Indian gentlemen who take an interest in the question to manage the museums.

(3) The establishment of *Provincial Museums* and provincial committees. The object being “to secure the best samples of art manufactures for each local committee and to provide the local committees with such notice or information as they may be able to give in connection with the art manufacture concerned in each case.” These provincial committees should take the utmost pains to obtain or select the best samples produced at each place of manufacture.

(4) The *securing* of the *co-operation* of *foreign museums* with the assistance of the Imperial Government the authorities of continental museums are prepared to extend such co-operation, and collections might be formed at these museums of the finest specimen of Indian artware.

These collections at the foreign museums would serve as a link between India and foreign markets in regard to these art manufactures.

(5) *Suggestions* to be invited from specialists in Europe and America as to in what ways the existing Indian Art work could be made more serviceable for European requirements and otherwise acceptable in foreign markets.

Something has already been done in all these directions; sample collections have been made at more than one Provincial centres but we need a more regular and extended organisation of effort on these lines with a view to ensuring more effective assistance in this important matter of revival and improvement of Indian Art work.

To these I would add the following further suggestions :—

(1) The *Eastern markets* are worth trying in this connection and samples of Indian Artware might be advantageously introduced to the notice of the commercial public. The co-operation of the Governments of Japan, China, Korea, Persia, and Turkey would be valuable.

(2) Moveable exhibitions of Indian Art work might be planned out in foreign countries in order to promote a wider appreciation of its intrinsic merit and commercial use.

(3) The Government of Lord Ripon in their Resolution of 1883 were disposed to entrust all this work of the Department of Agriculture—as being the only department then available. Now, however, we have one new ministry of Commerce and Industry and I would suggest that a *special bureau of Indian Arts* might be *organised* to work under the direction of that department and to advise and assist Government in carrying out practical measures in reference to this side of Indian Industrial Development.

Such a bureau exists in Austria, and the valuable work it is doing is well known. Cannot something be attempted in India on the same lines ?

The suggestions respectfully submitted for consideration may be thus summarised:—

(1) The formation of *Trade Museums* at all the provincial centres and in the Presidency towns, as also *one central museum for all India*.

(2) The publication of descriptive catalogues and handbooks both in English and the principal Vernaculars regarding the more important economic products and manufactures of the country.

(3) The institution of *special inquiries* in the Department of Commerce and Industry at each exhibition with a view to ascertaining the requirements of foreign trade in Indian articles.

(4) Collection of *samples of foreign manufactures* and supplying *information* in relation to them—the methods of manufacture and the machinery employed—to the *native manufacturers* ; *one or two industries to be selected* for such

treatment *at each* exhibition—industries for which India possesses special facilities.

Much work has to be done on the same lines in regard to *mining*.

(5) Request to Government this year to place Mr. Hadi and Mr. Dutt on *special* duty, one in connection with sugar-refining and the other in regard to mining who should visit the various Provincial centres with a view to dissemination of a knowledge of the newer methods amongst the people.

As regards art work, organisation of

(a) *Local Museums* and } at the centres of art manu-
Local Committees } facture.

(b) *Provincial museums* and } with a view to a compre-
Provincial Committees } hensive effort.

(c) *Moveable exhibitions*—In foreign countries with a view to promote a wider appreciation of Indian Art work.

(d) The formation of a bureau of Indian Arts under the direction of the ministry of Commerce and Industry to have the care of all this work.

A FEW WORDS ABOUT ELECTRICAL DEVELOPMENT.

BY SHIV NARAYAN, ESQ., M.A.,

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So great an interest is being at present taken in Electrical power developments, that I hope the present paper, though written on the spur of the moment and consequently rudimentary in its treatment of the vast developments, may serve to maintain the keenness of the interest, which has already been accentuated into enthusiasm by the warm and masterly advocacy of this new and marvellous means of industrial advancement by no less an authority than His Honour the Lieutenant-Governor of this Province. The Land of the Five Rivers—nay more than five—is so eminently fitted for hydro-electrical developments that with judicious and earnest organization of capital, its immensely rich resources,

now lying potential or running to waste, can in a surprisingly short time, be made to bear immense fruit.

Who does not know how rapidly the United States of America has won its way to the front rank of commercial powers by the persevering and patient endeavours of its scientists and engineers? What rugged mountains have not been sealed, what deep caverns have not been surveyed, what dangerous chasms have not been explored, what insurmountable barriers have not been swept aside, what mighty rivers have not been diverted into useful channels, what stupendous falls have not been harnessed for the good of the country? Every new difficulty sharpened the tools and quickened the genius of the pioneers. Invention followed invention. Factory after factory was added to the original plant, till now the whole continent is dotted with industrial centres. *Truly, God helps those who help themselves.*

In the industrial progress of the United States, Electricity has played a prominent part. Its manifold modifications commend it to the approbation of the most conservative. Its simplicity and beauty, satisfy the demands of the most fastidious. Its ultimate cheapness and low cost appeal to the economical manufacturer. As a means of power transmission, it outbids all other competitors. Hand transportation, rope, chain and belt transmission all make way for the new subtle agent of energy, which somehow mysteriously transfers power with the least loss from one place to another, from one condition to the other. It adapts itself to the diverse needs of human kind with a pleasant celerity. You can have the machines in your workshop run smoothly and without jerk or jolt, or you can light your lamps, or you can have your punkas pulled or fans started, or you can have your room warmed in the winter, your furnaces heated, your chemical products analysed and compounded, your messages sent, your conversation transmitted, your news " flashed,"— nay even your dinner cooked, your cigar lighted, your door closed, your clothes ironed, your piano made to play—by one and the same force—Electricity. And with the minimum of labour, with the greatest ease, just turn on the switch or press a button and you have the thing you want. Surely, a

servant that can do your bidding with such facility is good almost at any price. In the case of Electrical power, the price is not only not excessive, but on the whole low. If it were not so, Americans would have been the last of all people to pursue it with such zeal. Electricity has brought prosperity and riches in its wake in the land of the Almighty Dollar. Other countries have hastened to emulate its example, but have not yet replaced other agents by Electricity so extensively. However, the tide is with the new comer and its march is ever onward. It has in several countries replaced kerosene, candle and gas light. It has thrown into abeyance bullock, and horse transportation. Tramways or trolley-cars are becoming more and more abundant. Automobiles or motor-cars hold their own, against purely electrical cars,—but they also depend on the electric spark for their strength and speed. The cleanliness of Electrical cooking and heating is being gradually recognized. Several traders, *e. g.*, dentists, merchants are welcoming electrical applications in their particular professions! Wireless telegraphy has saved so many lives already. Electric aeroplanes and gyroscopic monorails are being tried and tested.

The main use of Electricity will be, as time goes on, for power purposes. Electricity is not, however, a prime mover. It is only a secondary product. Nature has supplied us with sources of energy from which it can be readily evolved. From coal and water, steam can be generated and the steam engine can be coupled on to an electric generator. From this electricity, motors can run and machines work, similarly gas and oil engines can be employed as prime movers for the production of Electricity. For small work, the Electric battery is generally used. Even large undertakings can be helped through by a storage battery installation but merely as a stop-gap. Electric power is most to be sought for near natural falls, or where with a reasonable expenditure, an artificial head of water can be made to give sufficient power to justify its creation. Of course, large cities like New York where such falls do not exist, can have steam to generate their Electricity: Hydro-electric

development is naturally more desirable where possible, although at times of low-water, an auxiliary steam plant may have to be provided for. There is so little waste and so huge a gain that the initial cost need not act as a deterrent. Take Niagara Falls for example. The falls were, of course, famed throughout the world already,—so magnificent and awe-inspiring is the spectacle of the vast sheet of water, bursting all obstacles and taking a gigantic plunge at three different places, at one point 168 feet high and at another 3,000 feet in contour. In less than five miles of its length, the level of the Niagara River falls about 300 feet. Of this amount the sheer drop at the Falls proper is only 165 feet and of the balance, 50 feet represents the change in the level of the river in the rapids above the Falls and 85 feet that in the gorge below. The average flow of water in the river is approximately 222,400 cubic feet per second; and the momentum or kinetic energy of such a volume of water falling through a total distance of 300 feet is theoretically capable of developing 7,500,000 horse power." Thus it will be seen that apart from the grandeur and charm of the scene supplied by the Falls, they have in them latent power enough for the demands of a large continent. A part of this power only has been commercially utilised and already the city wears a pleasant face and promises "to become one of the greatest industrial centres of the globe" as Nikola Tesla predicted. Power lies unused at several falls even today. So it did at Niagara Falls. What made it possible to convert the energy of the falls into Electricity for commercial use was first "the discovery of efficient and economical methods of generating and transmitting Electrical energy" and secondly "the phenomenal growth of the electro-chemical industries." From the practical point of view, it is not enough to convert the forces of nature into a useful form of energy. The energy must be sold. A demand must be created for it. A market must be found or formed. Otherwise the experiment would be merely an expensive luxury. At Niagara Falls luckily, the demand followed soon after the supply. "Now seventeen years after the breaking of the ground for the tunnel, the aggregate amount of

power developed by the Canadian and the Niagara Falls Power Companies is 160,000 h. p., with additional capacity in course of construction amounting to 60,000 h. p." The city has trebled in population and in assessed valuation. "Less than four per cent of the total flow of water has been diverted by these companies and its beauty and grandeur are unimpaired." In the Western part of the States, there are more abundant sources of water power and big machines and voltages and systems undreamt of by the pioneers are being employed. Mexico and Switzerland are also in possession of large hydro-electric installation. Coming nearer home, we find almost unlimited sources of power in India. We possess such mighty mountain ranges and such large rivers, that several sites can be found where at least a part of the energy can be well employed. In the case of some rivers the same stream of water can be made to create energy at two different places. There exists such a divided-fall installation on the Hoosic River in the United States. Two power stations have been built some miles apart. The upper one has a low head but large volume, the lower has a fall of about 150 feet and gets its water after the upper one has already used it. The two plants run in parallel and supply electric power to a large electric corporation 21 miles away. There is no reason why such a pair may not work here. Already, Mysore and Kashmir have constructed grand installations. The former has been a great financial success, because of the Kolar Gold Fields. Other schemes are being undertaken in Simla, Nepal, Moubhanj, etc. When the advantages of electrical power are rightly known to the manufacturers and the public, there will be a demand for all the power that these plants can produce. Of course there must be continuity of service in an electric plant as in other business. The customers must feel secure that their work will be done well and uninterruptedly,—and what is more, at a lesser cost than at present. There might be a little disappointment in the beginning, as the thing being new in this country, people are not so keen to go in for it without satisfying themselves at other's expense, whether the venture will pay. The reverse

would be the case in America. Nothing venture, nothing win. If progress is desired, some risk need not be feared and a little loss should not be allowed to dampen our efforts.

LIFE INSURANCE IN INDIA.

By MR. NARAIN DAS, B. A., C. E.,

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Although, in this country, Insurance can, by no means be considered to be an old industry having been only recently introduced here by the pioneers of the Western civilisation, it is a very old business which has been known to exist, in some form or another, from very ancient times. It began with Marine Insurance. Then gradually Life and Fire Insurance grew and developed out of those small beginnings till at last we, in the twentieth century, find ourselves startled at the very expansive character that modern Assurance business has assumed. We can not only insure our ships against the fury of the waves, our houses or property against the risks of fire, or make suitable provision for those dependent upon us after we are called off to other worlds by a Higher Power that rules our destinies, but we can secure compensation in the event of loss of sight or limbs through accidents and, if we are only up to date in our information as to the various schemes of Insurance in force in the West, we can insure our crops against the devastation of hailstorms, our plate-glass against the carelessness of servants of mischief mongers, our cattle against the ravages of disease, our ledgers against bad debts and our business investments against the risks of possible loss. We can have the fidelity of our clerks and establishment guaranteed and our race horses assured against the infidelity of grooms open to temptation. Add to these, the House Purchase Schemes that have been recently introduced and have become so popular in Europe, and you have, before yourself, the whole Modern Assurance business in a nut shell. You will, thus, see how largely it guards, enriches and improves human life in all its aspects and connections, social, industrial, physical, and even political.

We, in India, are not yet quite up to date, however, and many of the schemes that are so popular in Europe are conspicuous in this country by their absence. Thus, for instance, while Life Insurance Business has now quite a goodly number of devotees to tackle it in its many and various aspects and features, and even though Marine and Fire Insurance Offices are by no means wanting among us, we have no offices in India—Swadeshi or Foreign—to offer us the benefits of Plate-glass Insurance, Profit and Loss Insurance, or Cattle Insurance. The General Assurance Society Limited of Ajmer, seems to have made a sort of half-hearted attempt to introduce Horse and Cow Insurance but the experiment proved a failure and they have now dropped the scheme altogether.

The Bharat Insurance Company, Limited of Lahore are doing some business in the line of fidelity guarantee but so far the scheme does not appear to have attained much popularity.

The National Insurance and Banking Company Limited of Amritsar, again, are the first to give a trial in India to their House Purchase Scheme which they have only recently introduced. The business has a feature before it but in the slow-going East these things take their own time in percolating down to the intelligent masses and receiving their due share of support and attention.

But my object, to-day, is not to confuse your mind with all the different kinds of Insurance. I shall, therefore, confine myself to Life Insurance alone, surely the most well known, popular, and mostly followed branch of assurance business in India especially and all over the world generally.

It is only within the last quarter of a century that the principles of Life Assurance have made any headway in India. It was no earlier than 1874 when the late Mr. McLauchlan Slater established the Oriental Life Office at Bombay and in spite of much opposition on behalf of the Indian Press, succeeded in laying down the foundations of what is now one of the most prosperous life offices in India. Nor have the Indian Government been slow to appreciate the value of Life Insurance business both as a measure of public

good as well as a safe, lasting and never failing source of Revenue; and even though, during the earlier stages, objections appear to have been made against Government interference with private enterprise in this respect, the present, by no means unenviable, state of the Postal Life Insurance Funds run by the Government, shows that our rulers were too shrewd to let such an open sesame to treasures untold, to slip off their hands, whatever may be the merit of those objections. Much water has since flowed under the bridges and now we find every province (except perhaps the Provinces of U. P. and Agra) with one or more life offices of its own. In Bombay there is the Empire of India Life Assurance Office besides the Oriental, above mentioned, to which list might also be added the name of the recently established office, the Swadeshi Life Insurance Company, Limited, of that town. Bengal has produced the National Insurance Company, Limited, the National Indian Life Insurance Company, Limited, the Hindustan Co-operative Assurance Office, the Indian Equitable Insurance Company, Ltd., the Eastern Life Office and several others. In the Punjab there is the Bharat Insurance Company, Limited, and the Co-operative Insurance Office of Lahore, as well as the National Insurance and Banking Company, Limited of Amritsar, in which connection the Punjab Hindu Mutual Family Relief Fund may also be mentioned and the recent small office at Gujranwala known as the Hindustan Mutual Assurance and Benefit Society, Ltd. Even the deserts of Rajputana have come to possess a life office at Ajmere known as the General Assurance Society, Ltd. The Madras Presidency has lately been having so much of it, especially the lighter and the more trivial kind, as to win quite a notoriety in this respect. I have, of course, not mentioned the Gresham Life Office, The New York Life Insurance Society and other foreign institutions in which we, as Indians, can have no pride or lasting interest.

Life Insurance Business has thus taken a firm root in India, and the profession of Insurance Agent or Canvasser is becoming more and more popular day by day.

And now, having come so far, one might just enquire

what is Life Insurance ? What are its merits as a paying business and wherein lie the sources of its profit ?

Life Insurance business is an industry requiring credit, integrity, intelligence, education and powers of organisation. Having sprung up from mere betting, gambling ventures or guesses against individual, marine, fire or life risks it has now attained to the rank of an exact science. The science of Life Insurance to-day is as exact, as unerring, precise and true as Mathematics. Its object is to make provision against old age, sickness or disablements, whether total or partial, temporary or permanent, and to provide, in case of one's death for his survivors, dependents and heirs. The wise old Greeks rightly defined man as "the forward looking creature"; and if there is any one industry that has done so much to look up more to man's future interests than to his present welfare it is Life Business. Other industries provide man with his daily bread and go no further. Life Insurance advances a step further and helps man to take care of to-morrow also ; for true progress and development lies not in cherishing sweet memories of the dead past, nor in mere thoughtless revelling in the short lived glories of the transient present when youth and luck are on our side, but in looking ahead and building up a safe and great future when the odds are against us and when it would be too late to recall what will then be powers and resources of the past.

Generally speaking, Life Business consists in the following provisions —

- (1) Payments at death, *i. e.*, Assurances ;
- (2) Payments on attaining a given age, *i. e.*, Endowments ;
- (3) Payments during old age, *i. e.*, Pensions or Superannuation Allowances ; and
- (4) Payments during sickness, *i. e.*, Ailment.

Of these, the fourth item has as yet not received any attention in India. In some of the Western Offices the first class includes the following benefits, *viz.* :—a sum of money, generally called a "Funeral Allowance," payable on the death of (1) the member, (2) his wife or widow, and (3) his children.

Then, there is the insurance against accident risks. This sort of business is not favoured by most of the Indian Offices. The National Insurance and Banking Co., Ltd. of Amritsar have introduced Popular Policies covering accidental risks also, but the provision does not seem to have evoked any enthusiasm. Joint life insurance is unknown in India, but in England and America such business is by no means uncommon.

This, then, is what we call Life Insurance business, and it is a very profitable business if worked on a scientific basis. The following are the items which, jointly and severally, bring revenue to the coffers of a Life Office:—

1. *Lapses.* When the Policy-holders of an Insurance Company discontinue paying their premia, as settled by the terms of the contract, their policies are said to lapse and they forfeit all rights to the benefits of the Policies unless and until they can get those policies revived, *i.e.*, brought into force again, by paying up arrears along with interest and penalty according to the rules of the Life Office. If not revived, the past premia already received by the Company remain as so much clear gain to them since no return for the same is any longer due to the late policy-holder. If revived, the additional interest and penalties bring in something extra to which, in the usual course of business, if the policy-holder had not run to default, the Office had no claim. During the period of lapse no life benefits accrue but the policy-holder has to pay up for such unprotected periods, if he cares at all, to reclaim his old rights as a Policy-holder. This source of income generally runs to substantial amounts, for lapses are by no means uncommon. It may be due to reduced income or altered circumstances; to neglect or forgetfulness of the dues to the Life Office for sometime, whatever may be the reasons, and the subsequent hesitation to pay arrears and penalty which, not unoften, accumulate to decent figures; to loss of faith in the integrity or solvency of the Office; or to emigration to foreign lands. Then, there are sometimes other rare causes beyond one's control, such as occasional fits of madness or loss of liberty by imprisonment, etc., for some offences, technical or political. However, the

fact remains, that quite a number of policies lapse every year.

2. *Surrenders.* When a policy has been in force for some time (three years or over as the case may be) the Policy-holder comes to possess the right to surrender his Policy, if he no longer wishes to remain a Policy-holder. In this case he surrenders his Policy in return for a certain proportion of the premia paid by him returned to him (generally 25 to 50% of the premia paid). This, then, is another source of revenue.

It is not, however, to the above sources of chance income that a well-established or decent Office looks. In fact, lapses and surrenders are always discouraged as leading to loss of so much permanent solid life-business. The real prosperity of an office, therefore, lies not in the profits arising from lapses and surrenders but as under.

3. *Higher Rate of Interest earned than calculated.* In the calculation of premiums payable on life-policies, Insurance Offices generally allow 2 to 3 per cent. as interest on these funds which remain in their custody till the policies mature for payment. Nor do Life Offices keep such funds idle in their hands but take pains to see them invested in as safe and lucrative manner as they possibly can. If the Office succeeds in earning $3\frac{1}{2}$ or 4 per cent. on these monies on which only 2 to 3 per cent. is being paid (and there is no reason why a well-worked office should not) this means so much income. India has a great advantage over the European countries in this respect. Money being rather tight here, a higher return in interest can be secured in India than in the West. Add to these the fact that labour is much cheaper here than in the Western countries and you will see how much more smoothly and profitably we can run our Indian Offices in comparison with our English and American contemporaries.

(4) *A better Death Rate.* There are several tables of Mortality in force such as the American Tables, those published by the English Institute of Actuaries and others. In these is noted a certain percentage of deaths in the year for every year of age based on statistics and conclusions deduced

from the close observation and records of years. Life Offices calculate their premia with these foundations to start with. When, therefore, in a year or quinquennium (for life offices generally estimate their results of working after every three or five years) the actual number of deaths among policy-holders is found to be lower than was anticipated according to the calculations and tables, this feature adds to the profits of a life office.

4. Of course offices do not depend for support merely on these changeable and fluctuating factors of income. A certain percentage, termed "loading," in technical parlance, is added to the premia calculated according to the tables, in order to meet the working expenses of the establishment from which it is the aim of every wise and prudent office to economise and save something in favour of the credit side.

These, then, are the main items which contribute to the prosperity, or otherwise, of a Life Insurance Office.

It will be seen that this is a highly scientific business mainly dependent, for its future well-being, on the accuracy of the data and the correctness of the calculations based on the same. For an Insurance Office, therefore, it is absolutely essential to have a qualified Actuary at its back to guide and lead it along the tortuous paths of facts and figures. An Actuary is "the financial adviser of those who are responsible for the management of such institutions as Life Insurance Companies, Reversionary Interest Societies, Friendly Societies, Annuity Societies, Widow's Funds, Superannuation Funds, in fact, all institutions which *have to do with monetary transactions dependent upon human life.*" This is how Dr. Sprague defines an Actuary's status and responsibilities. "As the adviser of a Life Insurance Company, the Actuary has most important duties to discharge. When a Life Office is started, one of the first things to be done is, of course to prepare sets of tables. In the course of time, however, when an Office has been in actual operation for years, quotations will be wanted of premiums for various special risks and it is the Actuary's duty to calculate those premiums. In order to do this satisfactorily in all the various cases that arise, both practical experience and a thorough knowledge of the

theory of the subject are essential. In calculating premiums, the Actuary must not be guided simply by the rules laid down in the books. He must keep his eyes wide open to what is passing around him, compare carefully the results of theory with the daily practice of his own and of competing Offices, and mentally register for future use the various practical hints thus obtained. If this is done systematically, his advice will have a value that no mere study of the theory of Life Contingency will give it." An Actuary, in short, is the physician that administers to the ills and maladies of a Life Office and keeps a watchful eye to guard the same against future evils.

What a great pity that we have not as yet thought of going in for this highly useful and lucrative line, which is very sad reflection on those who have plunged in this business without a guide or helper to advise or warn them. Some Swadeshi Offices, in the Punjab and elsewhere, put down somebody's name as Actuary, by courtesy, though he cannot lay claim to such distinction on the score of knowledge or merit. As far as I have studied the matter, only the Oriental and the Empire of India Life Offices in Bombay have their Actuaries. The other Indian Offices have managed to copy their figures, almost *mutatis mutandis*, and commenced to issue Policies. This course of conduct is not only unsafe but positively dangerous and it is time our Offices took immediate steps to requisition the services of some English or American Actuary, duly qualified in this art, not forgetting in the meantime to induce some of our countrymen to go to these countries and receive their training in this science.

This, then, is a branch of knowledge to which no attention has, till now, been given either by the Government or such popular institutions as the Society for Promotion of Technical Knowledge among Indian Students. This is more important than Tanning, Glass-making, Dyeing, Textile, Mechanical or Electrical Engineering, Sericulture, Agriculture or other industries in so far as no single business has ever wielded so much influence, on the public weal or woe of a nation. Just imagine, if the Oriental of Bombay or the Bharat of Lahore

or any other office were to fail to-day, what anguish and ruin would that huge catastrophe bring to countless homes, rendering many a widow or orphan destitute and denuding innumerable honest citizens of the accumulated savings of a life-time.

I would appeal to this Conference, therefore, to take early measures to invite public attention to this crying need and have Actuarial Training included in the list of foreign studies worthy of attention at the hands of our rising students.

Once we have our own Actuaries, our Offices have a great and glorious future before them, for India yields to no country in the world as regards cheapness of establishment and working expenses, higher return as interest on accumulated funds and a peaceful law abiding sober *clientele*.

One word more and I shall have done. Credit and integrity being essential the very existence of a Life Office, any attempts of mere laymen to combine and dabble in this line without sufficient funds or capabilities ought to be discouraged. These, while unable to stand on their own legs, only succeed in discrediting other, older and better offices and generally putting back the hands of the clock of progress. If this is checked and we are saved from the nightmare of daily cropping up new bubbles, the existing Offices will have time to grow and develop and add, in no small measure, to general welfare and prosperity of the nation, for what old Offices have achieved new ones can achieve provided all work on up to date scientific methods. In fact, the truth of drops making an ocean is nowhere more practically and forcibly illustrated than in the fields of Insurance. In 1875 the accumulated funds of the Oriental were only Rs. 21,549 but in 1908 amounted to no less than Rs. 3,22,79,991 and the current year has marked still further strides in that direction. The Empire, a younger Office, had funds worth Rs. 3,36,178 in 1901. Mark the rapidity with which they have risen, for in 1908 we find the same standing at 28 lacs of rupees. The same may be said of the Bharat and others. In Europe and America, Insurance Companies are a great tower of strength to the people. In fact, in the United

States of America, institutions like the New York Life Insurance Company have wielded immense influence in the politics and legislation of those States, so much so that even a President dare not displease them. When such is the career of Life Insurance elsewhere, why should it be otherwise here in India? Only if we work on the right lines we are sure to find in Insurance Business in this country a huge reservoir of power, wealth and influence.

May our existing Life Offices prosper, aided by the light of wisdom, backed and supported by the vast Indian public, and guided and helped by the Heavens which help those alone who help themselves! This is my prayer in which I am confident every patriotic heart will join. Amen!!

THE PROBLEM OF THE INDIGENOUS WORKMEN AND INDIGENOUS ART.

BY A. TELLERY, ESQ.,

Benares.

I, in my last year's article, referred to the lamentable condition in which the Indian art workman drags on his miserable existence and the enormous difficulty, which he has to face with regard to his manufactures, against imported goods made by machinery; the cry is everywhere for *Swauleshi* goods and for new Industries. But how is *Swauleshi* to be pushed on and by what means should the new Industries be established? The labour is here in any form and quality, but there are no masters to train this labour to new work and to new ideas and if we have no masters and no guides, any art Labourers and their works are damned. Already we have lost too much ground and delayed by far too long and if this condition will go on for a couple of years longer, it will be utterly impossible for us in INDIA to do anything against western imported goods; so, what is to be done to keep our artisan employed? Many suggestions have been made but up to now nothing has been done and what has been done for any improvement in any other part of the country, the progress is so slow that we have to say, nothing is done.

If we wait for any master foreman from the proposed Industrial technical school, then we might as well say good bye to our industrial development in the more artistic branches of work. We are late in these days to be able to wait for these masters foremen. We must be acting and doing something towards opening the field and establishing industries to receive those master foremen and give them a practical training, etc., if there are no industries. What will a master foreman be good for and he would not be in a position to establish new industry and carry it out in a business like way with only his school training. No, he must have several years practical training before he is in a position to be in full charge of any work and this is the reason why we must have our several industries established before hand. If we won't do this, we shall be in a worse position than we are now. It will be the same with the industrial schools as with the present colleges. They will turn out young men ready to take up appointments by the score but they would only find that there is nothing for them to do and that there are no industries in which he could get appointment and there is no body who would advance money to establish some work and also to buy his goods.

In my last year's article I suggested that a committee be appointed in every province to go thoroughly into this industrial question and prepare schemes of work which can be carried out. Up to the present I have not heard that in any city in the whole of India such a committee is in existence and if we persist in not establishing such committees, then how is it possible to carry on *Swadeshi* ?

At present I should like to propose that first and foremost, we should establish the Indian industrial development society with head-quarters either in *Bombay* or *Calcutta* and branches in every province with sub-agencies in every city. The Head office should be in a position to provide every kind of information the branches might require for the development of indigenous industry and in establishing new industries, the work of the provincial branches should be to be in communication with the people and

put before them proposals and some ideas in which way certain industries should be carried out and if developed what machinery and what expenses would be incurred and also what profit could be made out of them. The chief aim of the branches must be to form companies and if companies are floated people will take a larger interest in the work than if such concerns are financed by single persons.

The branches and head office should also help the manufacturer to find in a market for his goods and also be helpful to him in other ways. The society should give all preliminary advice *gratis* but if the person or company is starting work or ordering goods through the society, then in all such work a certain commission should be charged which would pay something towards the expenses. I believe the society would *be half* supporting in the first year.

All kinds of industries want development and expansion ; and as we have not the men to carry out this work with up-to-date machinery and with a profit, we are obliged to import good trained and reliable men, who would train our workmen to perfection in the new arts of the west and so put us on a footing to be able to compete with imported ware. Further, it would be advisable if the society would be the right hand of the Indian Industrial Conference and through whom the Conference would be in a *position* to verify all the information necessary to be put before the General Meeting which require to be brought before the general public or the Government.

An annual report of the working of the Society should also be put before the General Meeting of the Indian Industrial Conference for the information of the public and the members of the Committee.

The only development that could be noticed is in the cotton weaving and mining industries. As for the hundreds of other industries there is no progress whatever. Out of recently started industries such as Matches, Glass, Metal; and a few others, some had to be closed and others which exist have a precarious existence.

Their failure was probably due to financial difficulties or because they did not secure a market the goods they manufacture are inferior to imported goods or the rates being higher they cannot compete.

The principle in any undertaking should be first to see that the undertaking is in a healthy financial position and under good control. The speech of the Hon'ble Sir Vithaldas Damoder Thackersey while supporting the 7th Resolution of Madras Industrial Conference, fully explains this point and warns people from rushing into business without first taking stock in which way it should be carried on.

As want of space does not allow me to write fully on this subject and give particulars of the various industries which should be remodelled and could be taken up and worked profitably, but I shall be very pleased to give my views and to help to establish Swadeshi industry. I should have liked to attend the conference personally but I am not free to be away from my business at the present time.

I trust that my humble efforts will bear some fruit to the progress and the development of the industries in *India*.

JOINT-STOCK COMPANIES AND CO-OPERATION IN THE PUNJAB.

BY W. S. HAMILTON, ESQ.,

Registrar of Joint-Stock Companies, Punjab, Lahore.

There is in the Bible a well known story of how Balaam, a prophet of the Lord Jehovah, was called upon by Balak, the king of the Moabites, to curse the people of the Lord who were invading the Moabites' land. Balaam went up to the king, but moved by the command of God, he blessed the king's enemies whom he had come to curse and heaped new disaster on the king who had summoned him. I think I am somehow in the position of Balaam for in recent years in the course of my duties I have had on more than one occasion to curse many of the works

of the Joint-Stock Companies of the Punjab and lo ! now I am called in to bless. Shall I bless or shall I curse ? Can I assist those who are, or who hope to be, directors of companies and who desire a blessing on their projects or must I condemn them as the leaders of vain speculations and the beguilers of the multitude ? I think I can honestly bless, for of one thing I am sure and that is that the future progress of industry in the Punjab must very largely be under the guidance and in the hands of Joint-Stock enterprise. Mistakes have been made and failure has been not uncommon : many Joint-Stock Companies are defunct, others are moribund or racked with disease ; but those which are still alive, must be nursed into greater vigour ; and the multiplication of healthy Joint-Stock Companies is not only beneficent but indeed indispensable. We can bless the movement of co-operation amongst capitalists and recognize it as a mighty industrial power while we do not shut our eyes to the disasters of the past and the blemishes of the present.

The fundamental characteristic of a Joint-Stock Company is the combination of relatively small capitals to form one large capital to be used for corporate purposes under the direction of representatives of the contributing capitalists. The value of such combination is of course enormous, especially in a country like the Punjab where large accumulations of capital or productive wealth are very rare but hoarded savings are almost universal. Large businesses, great manufacturing establishments, banks, mills and even ginning factories cannot be built up and worked successfully unless there are sufficient funds for the construction of adequate buildings, for the purchase of machinery of the latest pattern, for the payment of salaries and wages and for tiding over the initial period of unremunerative outlay. Few individuals can venture their fortunes entirely on a project of this sort, but there are many small capitalists who can well

afford and, if conditions were favourable, would undoubtedly be eager to assist in the building up of the capital required. And the bigger the capital, the greater the chance of success, for the whole tendency of modern industry is towards larger and larger organizations, and economy is found to lie in the massing of capital in big businesses. The factory displaces the home industry and the large factory supplants the small factory. It is doubtless true that the most go-a-head businesses are probably those in which there is private ownership and the single brain and eye of the master secure singleness of purpose and rapid action, and that Joint-Stock Companies are sometimes wanting in energy and consistency: but the fact remains that without Joint-Stock Companies it is not possible to get together sufficiently large accumulations of capital.

There has of course been a considerable deal of company promoting in the Punjab in recent years and latterly there has been almost a boom.

Let us look at the figures for companies with share capital for a few years; and as we are concerned primarily with Indian Companies, let us exclude the three large companies which are mainly European—The Punjab Banking Company, Limited, the Alliance Bank and the Murree Brewery Company.

In 1900 there were 52 companies with authorized capital of 143 lakhs and paid-up capital of 50 lakhs; in 1906 there were 65 companies with authorized capital of 165 lakhs and paid capital of 71 lakhs: there are now 128 companies with authorized capital of 440 lakhs and paid-up capital of 113 lakhs. In three years the number of companies has practically doubled and the authorized capital has been nearly trebled; but the paid-up capital has only increased by 59 per cent. Whereas 100 rupees of authorized capital used to yield 43, it yields only 26 rupees now.

From these figures it is manifest how very small a

proportion of the authorized capital is actually paid-up: if we had the figures for subscribed capital I think they would shew that the subscribed capital is also very much short of the authorized capital. That means that the public are not eager to trust their savings to Joint-Stock Companies; they are shy and do not respond to the blandishments of the company promoter; and even when a man, more speculative or more complacent than others, promises to subscribe, he often fails to pay up the calls made upon him.

This public proclamation of no confidence cuts off the root of Joint-Stock enterprize. You cannot build factories with a blank subscription list. In the first place capital holds back because the disasters, the mismanagement and the frauds of the past have frightened it. The burnt child fears the fire.

Some of the grosser incidents of these failures may be known to you. One large company failed because the Managing Agent decamped owing over a lakh of rupees to the company and has not since been heard of. In another case the Managing Director of a spinning mill went to England for about a year and a half ostensibly to learn the higher branches of his business and to buy machinery. He travelled first class, his board and lodging cost nearly 6,000, a pleasure trip to Paris cost the company 200; and all this was shewn as an asset of the company under the head machinery. He bought, it is true, some machinery but it was not worth its enhanced cost to the company and he certainly brought back 300 worth of umbrella cloth as the product of 18 months stay in England. Then there was a company which used to show the losses of each year on the assets side of the balance sheet as preliminary expenses which went on mounting up year by year, while a profit was shewn; and this company was able, just before it failed, to induce people to take shares by this flimsy mark of prosperity. There are many companies formed apparently with the sole object

of paying a salary to the Managing Director and never start any work at all. In a word, a very large amount of dishonesty has come to light in the management of Punjab Companies. Mutual confidence in one another is not a characteristic virtue of all communities but it is one which lies at the bottom of commercial co-operation; it is a virtue of very tender growth and the rough life of commercialism must give it many rude shocks. If it is to survive and blossom, it can only be by commercial men setting up as high a standard of honesty in their corporate actions as in their private. It is of course a truism that corporate honesty is much rarer than individual honesty. Men acting together do things without shame which they would never do in their private intercourse. One explanation of this is that, as some one has remarked, the generalization that honesty is the best policy is the lesson of long years of commercial experience and not an intuition. We must hope that this lesson will be learned speedily and the renown of the honesty of Punjab Companies win back that confidence of the investor of which, I fear, the sins of a few have deprived all. In the next place there seems to be a very common idea that any educated man can become a successful business manager. There again looms disaster and consequent public distrust. Lawyers are often—especially in this country—representative of the acutest intellect of the time but it does not follow from this that they can manage an industrial business, still less an enormously intricate organization like a bank. Let the cobbler stick to his last. Perhaps the feelings of those I refer to will be less hurt if I quote a description of the qualities required in a director of a company, which I read the other day:—"All our complex forms of industry involve sometimes in the directors engineering or practical genius, a sort of instinct of the market and a life-long familiarity with an involved mass of considerations partly mechanical, partly monetary, partly administrative. The head of a great

production is like the captain of a ship or the general of an army. He must have scientific knowledge, technical knowledge, practical knowledge, presence of mind, dash, courage, zeal and the habit of command." Well, I do not think a man need feel ashamed of falling short of such commercial heroism as this. But let us learn the lesson that the promoters and contributories of the capital of a company must not seek to usurp to themselves the actual managing of the company. That is the separate function of the Manager or the Managing Agent who should have been trained by long practice in the branch of business concerned. Choose your Manager for his special qualifications and then give him as free a hand as possible.

Then again I would suggest that a great hurry to declare a large dividend is not the way to build up a sound business or to attract the ordinary investor. At present the early payment of a high dividend is regarded as the event most to be trumpeted abroad in the youth of a company, and all sorts of devices such as the inordinate inflation of the assets head "preliminary expenses" are adopted to shew a profit in the balance sheet and to allow of a dividend even when work has hardly begun. Surely much more capital must be repelled than is attracted by this. What the small investor usually looks for is a fair rate of interest with safety and this is far more likely to be attained by the creation of a reserve and modesty in the earlier dividends. A minor cause of distrust is the exorbitant commission sometimes allowed to brokers or Managing Agents. Commission should be on profits, not on sales or purchases. What of the agreement made by one agent with the directors of a company that he should get one anna per maund of brass sold to any one but himself. He had only to sit still, refuse all brass and draw one anna a maund.

Lastly no one appreciates their savings being used by others for risky speculations and financial juggling.

Shareholders wish to be sure that their money will be used on the objects for which they contributed it, and not for the furtherance of financial schemes of the promoters which may centre round some distinct and separate company. If confidence is to be restored gambling and all that savours of it must be eschewed by banks and industrial companies alike.

But, it may be said, these are merely obvious instances of failures of the directorates to recognize their responsibilities, and it is the duty of the shareholders to exercise the necessary supervision over their directors. True, and this is one of the great difficulties of position, that the shareholders take so little interest in the working of the companies in which they have shares and are so ignorant of their powers. If only shareholders would study the Companies Act, would try to understand the balance sheets, would look up the lists of members and see whether their directors pay the calls on their shares and would attend the general meetings of the companies they, could enforce much more careful and less speculative management. They do none of these things. The powers of shareholders, if they will only act as a corporate body, are really very extensive. For information they are entitled to inspect the records of the companies prescribed by law and they can see the returns made to the Registrar of Joint Stock-Companies: if one-fifth of them can agree together they can have the affairs of the company examined by a Government Inspector: they can refuse to pass a balance sheet which does not truly represent the financial position of the company: they can refuse to ratify any unsatisfactory contract made by the promoters of the company with any agents or others and they can set aside any arrangement made by the directors which is not to the company's advantage—whether it be the appointment of Managing Agents or brokers or any other contract—even though the Articles of Association authorize the directors to do all such acts as could be done by

the company in general meeting. These powers are very real: let shareholders rouse themselves and use their powers.

This leads us to the question whether shareholders should be given any greater protection under the law than at present and if so how the law should be amended. As you are aware this matter is at present under the consideration of Government and those present who are interested in companies will have formed some opinion on the subject. To my mind the reform that is needed beyond all others is that Government should lay down by whom accounts may be audited. At present most of the so-called auditors are quite unqualified. To be an efficient auditor, it is not enough for a man to be honest: he must have a very special training as an accountant. In England balance sheets are audited by Chartered Accountants. Of these—there are not many in India at present, but there are a few and I would suggest that no one but they and one or two qualified Indian Accountants certificated by Government should be permitted to audit accounts. To provide the auditors of the future a special class for accountants, ending in a diploma, should be established in one or more Indian Colleges. Again a prospectus—or a return in lieu of a prospectus—should be obligatory, as it is in England. In it a mass of information is given which enables the investor to know a good deal more about his company than is now possible in India. Amongst other things the prospectus must shew the minimum subscription on which the Directors may proceed to allotment. In England the minimum is left to the discretion of the promoters; but if here it were fixed at $\frac{1}{2}$ or $\frac{1}{3}$, the flotation of many bogus and ephemeral companies, such as now appear and disappear, would be checked. A contentious proposal is that the Registrar should have some power of inspecting those records of the companies which are prescribed by the law or the Articles of Association. The Registrar would have

to be a man of discretion, a European free from all suspicion of interest in rival companies, and a man who could hold his tongue ; he would have to confine his inspection to seeing generally that the provisions of the law were observed and the rights of shareholders respected and to keep from encroaching on the duties of the auditor. Of course there are objections to inspection of this sort and Government would be taking on itself a responsibility of considerable magnitude, for, in the popular view, Government inspection would be taken to imply Government recognition and approval ; but at the same time I think such inspection would reduce abuses and restore confidence. There are other measures which can be taken, as for instance requiring that the balance sheets should shew investments in greater details than at present, but I have not time to discuss these now. All interested in our companies have doubtless considered them and I hope have approached the question not as directors should they happen to be directors on their defence and averse to any further restriction on their autonomy but with a real desire to find a solution of the great problem how to attract the confidence of investors.

The present is an extraordinarily favourable time for the increase of Joint-Stock enterprise. Capital is abundant but shy ; perhaps more abundant than ever before. The Punjab Land Alienation Act is not approved by all, but industry at least should benefit by the capital which it has set loose and by the existence of large accumulations of money lying idle in the hands of those who formerly looked to agricultural land for their investments but are now deprived of that outlet. May I suggest that that capital will yield far greater benefits to its owners, and to their country by use in the promotion of the industries of the Punjab than it ever did when it was employed to oust the peasants of India from their ancestral holdings ? A new page of history has been turned over ; the feudal volume has been closed and the book of the supremacy of

trade and commerce has been opened. The Land Alienation Act is the first chapter in the book. In building up the new industrial India we also start with the advantage that one of the assumptions of political economy, which may be stated in the words of Bagehot, "that every man who buys, buys with his whole heart and that he who sells, sells with his whole heart, each wanting to gain all possible advantage" is not so true here as in Europe. The cheapest market will not at the present time infallibly appeal to the Indian purchaser. Expensive home-made articles may be preferred to cheap imported goods, even though the latter may be better also in quality. This uneconomic preference for home-made goods may be just enough to furnish as effective protection of Indian capital invested in Indian industry as could be obtained from a customs tariff. Let Capital come forth and use the opportunity. But here a caution seems to be needed as to the nature of the Companies to be formed. There has in recent years been a great increase in the number of banks in the Punjab financed and managed by Indians. There were 2 Banks in 1900, 7 in 1906 and there are now 27. Perhaps one reason of this is that there is an idea that expert training is less necessary for banking than, say, for weaving or for glass manufacture or for oil pressing. This is a view which I cannot accept, but cannot now controvert. Without however going into this question, I think it will be committed that many of our banks are far from successful and a further increase in them is not to be desired. It is then to industrial companies that capitalists should turn. What is it they chiefly require? Surely it is men with expert and technical knowledge. If there are to be profitable producing companies—whether on a great scale or a small—the young men of India must obtain the necessary technical knowledge. Those who can afford it should go to Europe, and learn all they can of the jealously guarded processes of the great industries in their own

strongholds. They will have to labour hard for their knowledge, for trade secrets are not willingly imparted. For those who cannot afford to go to Europe, there are the lower grades of industry to be filled and a training for them whether as factory manager or as engineer or as expert mechanic or expert factory hand of any sort can be obtained in many places in India. It is an era of specialism in every branch and the insatiable demand for specialists of every grade and in every line must be satisfied if the larger industries of India are not to be starved. Without expert assistance capital must remain dormant or will waste itself in financial cobweb weaving.

I have not left much time in which to speak of co-operation. The term is a peculiarly elusive one and is used to cover a number of business arrangements which have not much in common and often are not co-operative at all. I think that for our present purpose we may say that when in any industry the workers come together and contribute not labour only but the capital as well the association so formed is called a Co-operative Society not a Joint-Stock Company. In the purest form of co-operation the wages system disappears and the working man, who has also contributed his share of the capital, receives his share of the profits, which are built up of the profit of his labour and the return for the use of his capital. But such co-operative production is a will of the wisp—except perhaps on a very small scale—for the simple reason that a labourer, who has saved enough to become a capitalist even in a small way will not willingly continue also to be a workman. Thus co-operative productive societies tend almost inevitably to become ordinary Joint-Stock Companies engaging labour and paying wages in the ordinary way: the only difference remaining being that the associated capitals are individually very small and the capitalists are men who once were working men. But if this is all that co-operation is, whence arose the enthusiasm with which the co-operative movement was greeted almost as a new

Gospel of Salvation, to which something of sacredness belonged, some 50 years ago in England? What was there in this special form of joint trading which seemed to its votaries to promise industrial and even social regeneration? There was here no newly discovered economic secret: there was no very wonderful revolution. But there was a marvellous burst of moral enthusiasm which found its outward expression in the formation of co-operative societies and wove these into castles in the air. Here were poor men struggling to save something out of their wages to invest as capital in these new societies, which were to regenerate existence; here were men of intellect devoting all their powers to the service of the new forms of self-help by helping others; here were men sacrificing present luxuries to provide the means of giving their children good food and clothes by clubbing together their little hoards so that by combined production and distribution high quality might be obtained at low cost; and, to crown all, these associations were possible only by reason of the complete trust in the honesty of their fellows which is the highest distinction of the early co-operators.

Of the several forms which co-operative Societies have taken in England I need not speak, as none but co-operative distributary Stores has been successful and those are not a form of co-operation which could find any place in Indian life as we have it in the Punjab. But I think there are openings for industrial Co-operative Societies of other sorts. Take the hand loom industry in which I am specially interested. We have scattered over the province an enormous number of weavers working in almost every village with antiquated appliances earning the barest pittance by weaving the yarn of others into cloth. They are the slaves of the village community or of the merchant on whom they depend for money advances and for years. They have no capital of their own, can weave nothing for sale and cannot find a market. On the other hand there are now in use several improved

forms of looms and warping machines by using which a weaver can double his output. These appliances may not be perfect but every weaver admits that they are better far than his own. But of what advantage are they when the weaver cannot buy them and if he did buy them he could not sell all the cloth he wove? Here is the opportunity for a Co-operative Society—not a charitable co-operative society, mark you—I don't believe in improving an industry by pauperizing it but for a co-operative society which will pay. Let the Mahajans or the landowners form a society by contributing shares, let them invite the weavers to contribute their small shares, let them buy warping machines, looms and yarn, let them lend them out to the weavers and pay the weavers at fair rates for the cloth produced—with it may be a bonus out of the annual profits—and then let them place the finished goods on the market. The demand for hand loom fabrics is still in advance of the supply but the producer cannot get in touch with the consumer. Kabul and the hill States to the North and North-west of the Punjab consume immense quantities of plain coarse cloth; lungis from Ludhiana and Hoshiarpur go almost to the confines of Russia and within our own borders Kes and lungis, handkerchiefs and coarse cloth and Jharans can be used in endless quantities. Will not some enterprising pioneers shew the way by forming some local societies of this sort? Only one more instance and I am done. In Lahore and many other large towns one constantly hears of respectable women who have little to live upon and by the custom of the country cannot come out to find employment for themselves. Could not a Co-operative Society be formed to organize some industry by which these women could help themselves? It has been suggested that the knitting of socks and vests and the like is a work they will and can undertake. It is respectable and sufficiently easy. Here then is a chance for capitalists to unite and buy knitting machines, hire them out to

the woman on the hire-purchase system, collect the knitted goods and place them on the market. Again the demand is almost inexhaustible. The society would earn its profits both by the sale of the machines and by the sale of the manufactured goods ; and the principle of co-operation and the energy of the workers would be maintained by paying the women a share of the profits as well as wages on the piece system.

Both these are instances of the distribution of the goods produced by a home industry and it is in this direction that the future of the co-operation in India seems to me to have the fairest field.

THE MINING AND MINERAL PROBLEMS.

BY THAKUR SINGH, Esq.,

Jagdeo Kalan (District, Amritsar).

I am greatly struck with the danger that is threatening the mineral and all other industries of India owing to the competition of the European capitalists.

I contend that even at the cost of slower development, European capital should be excluded at least from the native territories as far as Mining industry is concerned.

This, however, will not suffice to save India. It is not enough to protect the Native States from this threatening danger though I had recognised the existence of the danger for some time past, I had not fully realized how urgent is the need of taking immediate steps.

The following are a few figures that I have collected with some difficulty in order to make apparent the very real urgency of the matter. I have gone very thoroughly through some lists of prospecting and exploring licenses and mining leases granted by the Government of India during the past few years. From the names of the lessees it is easy to recognise, whether they are Europeans or

Natives, and in this way to find out the relative proportion of the mineral grants to both sections of the community.

The mining leases up to 1904, which may be regarded as really profitable are as follows :—

	Europeans		Indians	
1900	15495·10	acres	392·77	acres
1901	15057·86	„	2811·81	„
1902	6154·44	„	2067·98	„
1903	7883·60	„	39·00	„

For the five previous years the totals are as follows:—

	European		Indians	
1895 to 1899	23,772·40	acres	6882·13	acres.

The lists, from which I have derived this information only show the mineral grants from which the Government is entitled to derive some revenue. No detailed information is obtainable regarding the Native States or some of the Zemindaries, where the landowners can dispose entirely of the mineral rights but if those figures were available, I do not think they could in any way alter the conclusions to be drawn from the above lists. We all know, for instance, how completely the Bengal Coal Fields have fallen into the hands of European companies.

It is plain enough without needing any further comments that these figures reveal a state of things, which from an Indian point of view, may be regarded as a national calamity. What is already done, cannot be remedied and it is no use crying over spilled milk, but surely let us spare no pains in arresting the further economical loss to the country.

I will not enter here into any lengthy discussion as to the undesirability of introducing foreign capital into India, in spite of fallacious notions to the contrary. Works undertaken with the help of foreign capital must necessarily result in draining the natural resources of the country. In India, it has a still greater drawback in closing up all but meanest forms of employment to the natives of the country. The European companies may object to

employ Indians except for work in ordering purely manual labour, in fact for all cooly work

Whenever I attempted to discuss the question of mining, I have been told that responsibility in mining is of such a serious nature that it cannot be entrusted to Indians. All other kinds of employment may be open to them but not mining, and accordingly they have always been rigidly excluded from this industry. It is no use sending Indians to Europe or to America to learn mining if you have no Indian-owned mines in which to employ them, since the European companies will not encourage them.

One of the features that are most apparent in the statistics quoted above, is the fundamental difference in the methods of working as adopted by the Europeans and Indians. In Madras, there seems to have been quite a rush amongst the Indians in Mica mining probably because it is a thing which, for a short time, can pay with but little expenditure, by just grubbing at the surface. But I feel almost sure that none of them possesses the knowledge, the skill or the means required for deep excavations. The most remarkable feature of the contrast between the methods of the two communities, is the complete lack of mutual trust and combination amongst the Indians.

I consider that the only means of saving the present situation is that we should set to work every square foot of mining ground still available within India. Some of the wealthy native citizens with the aid of the Indian chiefs should for this purpose form themselves into syndicates.

I know that the argument will at once be raised that India possesses no capital ; such an argument will not appeal much to people endowed with an ordinary share of common sense. There are millions of able-bodied men in India. If they wake up, they will be able to reap for themselves rich harvest out of the boundless natural

resources with which our country is endowed. A little mutual help amongst some of our people is all that is needed to for the revival of mining industry.

We all of us refrain from acting, because we imagine the task to be more difficult than it really is. To prove that the complaint as to the absence of capital in India, is based on a wrong notion, I may point out, that most of the highly successful mining enterprises in India have been started with a very small capital. It is for fear of the necessity of giving a fair amount of employment to Indians that a few European firms may have no inclination to start works with Indian capital, but there are others who, I feel sure, would be very glad to join hands with Indian syndicates if there are fair chances of success. The prospecting licenses are cheap enough and enormous sums are not required in all cases to keep the mines going, once the mining leases are obtained. In the present state of affairs it is of no use to take an antagonistic attitude towards the European firms in India. What is wanted is to win them over to our side by making use of their capital and business experience.

Now turning to the various minerals that are worth exploring and prospecting for, I fear that with regard to the most valuable of all minerals, *viz.*, coal, most of it is being worked by European companies. At least Bengal with its vast and excellent coal fields is practically closed to native enterprise including fields in the native States of Rewa and H. H. the Nizam's territories. The most promising coal field in which it might be still possible to secure some mining rights is the Makum coal field in Assam. Syndicates should at once be formed to secure the prospecting license over such areas where such valuable minerals may be known to exist.

The so-called "Rare Earths" have not been found in India, simply because they have not been looked for, but they are surely there, the very fact of geological

similarity between Brazil and India is all in favour of the latter possessing large stores of these valuable minerals. Sometime back in Ceylon which is geologically a dependency of India a mineral has been found called "Thorite" which is richer in "Thorium" (the most valuable of rare earths) than any mineral hereto found. I have seen a specimen discovered by an Indian geologist in a native State, of a mineral containing "Yttrium", which, though not nearly so valuable as 'thorite' is nevertheless highly interesting as the very same mineral is found in Ceylon in company with thorite. In the same vein tinstone was also found.

Then again a mineral for which we must anticipate a rush and be ready for it is aluminium. It is likely to occur abundantly in the Central Provinces, Nizam's territories and the Kashmir State.

There are common minerals occurring in large quantities for which it needs nothing more than a little sound organisation, for them to become large sources of wealth for the country. I need but mention here our inexhaustible supply of marbles, such as those of Rajputana. There are also valuable pure limestones such as those of Rewa, from which the best quality of cement can be prepared. Regarding these rich stores of pure limestones of Rewa, I must state here that a large portion of them has already fallen into the hands of a European firm.

We must try to secure what little remains of the Manganese; like coal it has also drifted out of our hands. If we could start prospecting at once there are still some deposits left in various places, for instance in Dharwar, Belgaum and other places.

The Iron deposits have not yet been touched to any appreciable extent. The iron ores of India differ from those of Europe and are somewhat refractory to the methods of smelting at present in vogue, which have been devised for ores of a different character. This difficulty can be overcome if some little attention and study is given.

The Petroleum of Burma has mostly gone into the hands of European firms but there is still a field for prospecting in Assam, in the Panjab, in Baluchistan and Persia.

There are a few veins of argentiferous lead, of zinc, and of copper to be secured in various parts of India.

Concessions from Indian States ought to be secured wherever minerals of good quality are found.

It is necessary for Indian States to exercise great care and caution in granting mining leases otherwise careless working is likely to result in loss to the state, of and waste the mineral.

For instance the most regrettable feature of the Sambhar Salt lake is the careless way in which the salt deposits are being treated, owing to which, we fear, that the lake will soon become useless, and that the greater portion of the vast amount of salt still remaining in the lake can never be extracted.

For the progress of mining industry, we need two mining schools, at least one for coal mining and the other for metal mining, for both of which nature has provided India with splendid facilities. The Mining school for coal should be in the coal fields, either of Rewa or Nizam's territory. That for metal should be at Khetri with its rich ores of complex composition; Khetri should become the Freiberg of the East. Mining Schools are not the only things required. We want also Colleges for Electrical and all other manner of Engineering education.

There is somewhat of a pathetic touch of sarcasm in preaching thrift and economy to starving people. Nevertheless I am firmly of opinion that the condition of India is not hopeless. The mere fact that India still exists goes to prove it. Twenty years of well-directed efforts should suffice to save the country. But there is no time to waste and we want workers who are really in earnest. There is at present in our country too much of dilettantism in these matters.

" There is a tide in the affairs of men
That, taken of the flood, leads them to fortune."

AGRICULTURAL CREDIT.

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In any scheme of agricultural reform, the organisation of credit must perforce take the first place. This is universally accepted and it is in view of the recognition of this truism that the Government of India, a few years ago, resorted to special legislation and launched the experiment of co-operative credit in this country. It is true that previous to the passing of the Co-operative Credit Societies Act in 1904 there had been in the Statute Book measures—such, for instance, as the Land Improvement Loans Act and the Agriculturists' Loans Act—permitting advances being made to cultivators mostly on the principle of joint responsibility, in times of special need and for special purposes. These measures, as Mr. Gourlay pointed out at the Conference at Surat, had proved to be a blessing not unmingled with evil. In the first place the advances made under the provisions of these Acts reached only a particular class of the community, *viz.*, the more substantial and solvent cultivators; it offered them facilities of credit without encouraging habits of thrift. Owing to the strict conditions of security, the lowest state of the community were entirely left in the cold, and the Famine Commissioners of 1901 recognising this fact, made the following observations: "The cultivator, who is struggling in deep waters cannot hope to profit by a *takavi* advance. He is in debt because he is poor; and his poverty prevents him from obtaining the means of escape from debt. We recognise that it is impossible to reach by loans of public money, the lowest state of agricultural society; some security at least must be required. But we are of opinion that more may be done by a *development of joint personal security*." The Act of 1904 aims at such

development and it has made possible the establishment of several Village Banks or Co-operative Credit Societies, on the success or failure of which depends, in a large measure, the future of agriculture in India.

What is Credit and what is its function? How does agricultural credit differ from other forms of credit, such as banking and commercial credit, and what are its distinctive features? In the organisation of agricultural credit, what are the essential conditions for success? These are questions which have been touched upon in the papers read before the Conference in previous years, and I do not think it will serve any useful purpose, if I go over the same ground again. I propose rather to confine myself to a review of some of the methods which have been tried and found successful in providing agricultural credit to farmers in the West.

There are one or two points, which it would be well to bear in mind at the outset of our enquiry. In the sense in which we understand credit in Commerce we can find no trace of it in the Village Communities either of the East or the West. The only form of credit which has existed from time past is that between the landlord and his tenant or between the money-lender and his client. The rates of interest at which the cultivator could obtain loans have always been high and this is attributable to the operation of several causes. Foremost among these may be mentioned the absence of competition.

In the Village Communities of India—and I use the expression throughout this paper in a very wide sense, recognising as I do that there are different forms of these communities—every one had his work defined and the money-lender was an inevitable adjunct to each village, and performed as necessary functions as the village Brahman or the village barber. He was, as Mr. Perrott points out in the latest number of the *Economic Journal* 'part and parcel of the village polity' and his useful service

to the community could at no time be dispensed with. The custom which prevailed in those times of limiting the total interest to be demanded of the borrower, at the time of settlement, to 50 per cent. of the amount borrowed in case of cash payment or 100 per cent. if settled by paying in grain or cattle was, in a sense a benevolent one. With the progressive development of social life from a simple to a more advanced stage and with the political vicissitudes through which the country had been passing, there was bound to be a revolution in every department of activity. Intellectual renaissance was followed not only by a reformation in the social and religious customs of the country, but by a complete revolution in industry.

‘Thence came a change as all things human change’ and agriculture—that most ancient of industries which was all along considered to be a very easy mode of earning a livelihood—could not but be affected by the cataclysm. With the growth of population, it was necessary to resort to intensive cultivation which required large capital. The opening of railways and roads, of canals and communications revolutionised the simple industry and in any other country but India would have contributed to a decrease in the rural population. These changes coupled with bad seasons and foreign competition—with its concomitant evil, the lowering of prices—made the cultivators utterly powerless. The cry everywhere was for capital, but it was a cry in the wilderness. The village money-lender—who not infrequently is himself a borrower—was not equal to the occasion and had to give place to the unscrupulous, but wealthy, *Marwari* who, businessman as he is, naturally took advantage of the loneliness of the locality and the general ignorance of the ryots and extorted enormous rates of interest for loans, thus involving the unhappy victims in serious financial difficulties. But through all the revolutions and changes which they have suffered, the union of the Village Communities has, as

has been acknowledged by no less an authority than the late Sir Charles Metcalfe, contributed more than any other cause to the preservation of the people of India. In any measures therefore which may be adopted for bringing about a betterment in the material condition of the 'patient, humble, silent millions who subsist by agriculture' and 'who are the bone and sinew of the country,' it is essential that we should try and preserve what is best in the system of rural self-Government which the village communities represented. "These communities," in the words of the late Sir Mont Stuart Elphinstone "contain in miniature all the materials of a State within themselves, and are almost sufficient to protect themselves if all other Governments are withdrawn."

In dealing with the requirements of the classes engaged in agriculture, there are two kinds of credit to be taken into account: (a) Real credit for long loans and (b) Personal credit for short loans. "Where the whole or part of the permanent working capital is borrowed, and the borrowing takes place without any immediate prospect of repayment of the principal or of more than the interest, with or without such small instalments of principal or contributions to a sinking fund as will not make the annual payments very substantially greater than mere interest payments, long loans are called for on *real* credit—being a charge on immovables, especially on lands and houses, in the form of mortgage or hypothec. It is the function of this sort of credit also to supply funds required for building and permanent improvements, and also where the land itself is purchased, wholly or partly with borrowed money, or is subject to family or other charges, for the benefit of persons other than the owner or occupier * * * * * On the other hand, in agriculture, as in every other business, when an amount of capital has been provided sufficient for the average needs of the undertaking, it frequently occurs that the operator finds he has money on hand which he does not immediately want,

and quite as frequently that he has monetary need of money which he has not got, in order to make the most of his business, by taking advantage of favourable openings—buying in a cheap market—holding his produce for a rise—and the like. To provide the money thus required for a few days or weeks—in agriculture more often for a few months or even years—is the function of *personal credit*.” (See “Notes on Agricultural Co-operation and Co-operative Agricultural Credit in Germany” by H. de F. Montgomery, Bulletin No. 2, Miscellaneous Series, issued by the Department of Agriculture and Technical Instruction for Ireland). It is indeed a difficult problem to make a hard and fast distinction between these two kinds of credit; they have a tendency to overlap, but it is necessary to bear the distinction clearly in mind and restrict this tendency as much as possible.

Secondly, in dealing with a question which relates to the whole of India, one is apt to fall into the very common error of conceiving that he is dealing with a homogeneous whole. Letting aside the extraordinary degree of variance in *physical* conditions—such as soil, climate, &c.—and taking into account only the *status* of the agriculturists, both legal and social,—using these terms in their broadest sense—it is impossible, nay, far from correct, to refer in *general* terms to the agricultural community in India as a whole. We must remember we are dealing with numerous grades of people ‘from the naked cooly behind the plough, scarcely more intelligent than the animals he follows, to the Zamindar, money-lender or vakil living in the city,’ and it follows, as a matter of course, that any description of the economic condition of a particular grade cannot be made applicable to other grades. A classification thus becomes necessary and this must be based on the system of land tenures. There are certain features connected with it peculiar to India, the causes of which are mainly historical; for our present purpose, however, we may, broadly speaking, divide these classes into

(1) Landowners (2) Tenants, with and without occupancy rights, and (3) Agricultural labourers. Their wants are naturally different,—(number 1 would require to be provided with *real* credit and numbers 2 and 3 with *personal* credit)—; it is enough to remember that the difference in the status must be taken into account in devising methods to meet the economic needs of the several grades which form the agricultural community.

With these observations I may now pass on to review the different plans adopted abroad for providing agricultural credit. I must confess that my equipment for the task is incomplete,—and that in a very important respect. I have not had the good fortune to study the subject at first hand—by personal investigation in the several countries which I propose to survey as a whole—and I must, therefore, ask you to bear with me for any blunders due to such incomplete equipment. I approach the subject in the spirit of an earnest student and *not as a teacher*,—for I believe with Professor Price in thinking that economics, more than any other science, has suffered in the past, and is likely still to suffer in the present and the future ‘from the uninvited inconsiderate intrusion of ignorant, impatient charlatans, and nobody, therefore, has a right to set himself up as a teacher in the cause, unless he has qualified himself for the part by first becoming a pupil. If I have drawn the attention of my educated countrymen to the need for serious economic study and economic research work, the Conference may well congratulate itself on the achievement.” There are already signs of an awakening, and the formation of a Statistical and Economic Association in the capital of the Western Presidency a few months ago is the first step in that direction. The formation of such an Association may be taken as an earnest and as a recognition of the all-important truth that the industrial regeneration of any country is bound up, in a large measure, with the advance made by the people in economic studies.

Speaking broadly, two distinct organisations have been devised for meeting the requirements of agriculturists: (a) Land Banks for providing *real* credit, and (b) Village Banks, or Co-operative Credit Societies for *personal* credit. The latter, with a few exceptions, are modelled on the same general plan in the several countries in which they have been adopted. The special features of these Banks are strikingly akin to those of our typical village communities, and may briefly be described thus:—

(1) The Banks are managed by and for the members.

(2) The members are jointly and severally responsible for all obligations contracted by the Bank, and their liability is frequently unlimited.

(3) Funds are obtained principally by borrowing from outside on the joint security of the members.

(4) The area in which the Banks work, are well defined and restricted to narrow limits, and the members are carefully selected.

(5) All services are gratuitous.

(6) There is no paid-up capital, and profits are not paid as dividends to members, but are kept as a reserve.

The remarkable growth of these Village Banks in the various countries of Europe and America, and the success so far achieved in our own country, show the sterling worth of the principles on which they are based. Their scope is limited and it is well to recognise the limitation. They serve the useful purpose of bringing 'the small ryot who has good security into communication with the capitalist who has money to lend on good security at a reasonable rate of interest' They do not, and they cannot, hope to benefit—at any rate for the present—the hopelessly insolvent ryot nor is it possible for them to go in for business on mortgage security. They have been most successful in helping small farmers who have no security, excepting their personal standing as upright men amongst their fellows.

For the purpose of financing these Village Banks there are what are called District or Central Banks, and the *ideal* Central Bank, it seems to me, is a federation of societies on a joint-stock basis as is done in Germany which will serve the purpose of a link between the societies and the money market or to quote Mr. Wolff's words, 'a bridge spanning the gulf of mutual strangeness over which business can be carried backwards and forwards.' The leading Anglo-Indian paper of Bombay, however, thinks that 'such an ideal institution cannot obviously be established at once' in that Presidency and observes that the promoters of the Bombay Central Bank scheme are prepared to establish a Bank 'if Government would guarantee the interest and capital on the debentures of the Bank to the amount of four times the subscribed capital. The Government guarantee will enable the Bank to raise long-term loans at a low rate of interest.' The issue to be decided, as that paper puts it categorically, is this : should or should not Government aid be given to the Central Bank ?

This subject is one on which there has been a great diversity of opinion. Mr. Wolff, the leader of the movement in England, is for pure autonomous co-operation, and on principle opposes *financial* help from Government, though for purposes of *teaching co-operation*, he is willing to accept every penny that Parliament might vote. While State interference may greatly hasten and multiply results, he thinks, and rightly, that they can only be at the expense of their quality. "If the business of providing money is good and self-supporting, it should be possible to find capitalists to come forward and take it in hand as a business venture." I shall quote a paragraph or two from his latest work on Co-operative Banking :—

"Co-operation cannot be generated by endowments. No doubt you may, with the help of such, create a vast army of organisations which call themselves 'co-operative.' But raised up on the false foundation of dependence on others, not only for material means, but also for initiative, they are sure to turn out addled

eggs. They may prove admirable conduit-pipes or "relief," made to look respectable by the use of a popular name. But they can be nothing more. In Germany, since the creation of the State-endowed Bank, which at first actually pressed its favours upon them, they have sprung up like mushrooms in a warm autumn night. But what lasting, what inherent good is there in them? We shall see presently how a drop of worthless soap-sud liability may be blown into a huge showy bubble of credit. It only remains to be seen what will become of these societies when Government help is withdrawn." (p. 175).

A little further down on the same pages, he writes :—

"We know that the State, though it may appear liberal in the matter of interest charged, knows, like S. Martin of Tours under all circumstances to get the best of a bargain. As will still be shown, Government inspection, which is generally inseparable from Government assistance, is the very worst kind of inspection which Co-operative Banks could submit to being misleading, because under its hallowed seal of officialism it conceals more mechanical rule of thumb enquiry. Nevertheless it may prove impossible to separate Government inspection from Government support with funds. And training to dependence, and to trusting in others, is bound to undermine self-reliance and independent effort, which are the two main pillars upon which genuine co-operation must ever rest."

As against—I should rather say, as a modification of—this opinion, we have that of Signor Luzzatti, the present Italian Minister of State, the leader of the movement in Italy and the President of the International Co-operative Alliance. He has devoted all his 'white-haired wisdom and youthful courage' in the cause of co-operation, and it will be no exaggeration to say that the remarkable transformation which has been brought about in the agricultural and economic condition of Italy during the last thirty years is due mostly to his individual initiative. His opinion ought to be particularly valuable to us in India, as a very large number of the Co-operative Banks which have been formed in the several Provinces are based on, what may be called, the Luzzatti model. He believes in the need of both the one and the other, as the capacities of the workers and *local conditions* may require. At the co-operative Congress at Cremona two years ago, over which he presided, he made the following significant declaration :—

"We look upon the single co-operator armed with his capacities multiplied by association, as the *main strength* of the social peace army marching in the vanguard to great battles and great victories, the State as the reserve force, which on certain occasions and in certain contingencies places itself in the front rank to win the battle. We think all theories are good, but the best is that which saves the greatest number from the usury of money, the usury of rent, the usury of goods the best is that which most fully achieves the purpose of raising these people bowed to the ground, of uplifting their faces towards the radiant sun of liberty. That doctrine is the purest, even if it disobeys some metaphysical laws of economic principle."

The controversy on the subject, even among co-operators has been vexatious. A great deal has been said and written on both sides, and 'the discussions of rather an academical character' which the *Times of India* states the leaders of the movement in Bombay are now engaged in will be altogether fruitless. It will be so much powder and shot wasted. In a matter like this one need not be too pedantic. While State aid is subversive to one of the cardinal principles of co-operation which is mutual self-help, we are all agreed that in the initial stages of the movement, help of this kind is not only necessary, but desirable, and even the much abused Mr. Wolff is prepared *within certain limits* to agree that a State-endowed central Bank may do good. This is a matter which has to be decided according to the peculiar needs of each place. The only point to be kept in mind is that principles which have stood the test of time and experience in other climes, and in an environment similar to our own, should not be unduly sacrificed on the plea of 'local needs.' So far as Europe is concerned, the guiding line of all recent co-operative activity may be stated to consist in building up after the architectural model *from the bottom to the top*, from self-governing local societies to unions.

There is one other point to which I would draw your attention while on this subject. The provision of credit is but the first step in the promotion of agricultural welfare, and unless it is supplemented by other forms of co-operative effort, no appreciable change in the economic

condition of the people is possible. The Italians, for example, have devised an admirable system by which the peasants have both the means of raising money easily and facilities for laying it out to the best advantage. I have elsewhere described this at some length and those of you who have carefully studied Pratt's "Organisation of Agriculture" know all about it. I shall content myself for the present by drawing your attention to the fact that as a *productive* calling, agriculture has to entirely depend upon the market, and as Mr. Wolff so happily puts it, that market distributive societies can provide. "They can do much more. They can keep agricultural co-operation sound and democratic. By means of the dividend which they procure for their members on articles which *every* one, even the poorest *must* buy they can provide the money necessary for starting agricultural co-operation—which needs money to start with. They may in fact be made a veritable gold mine to agricultural co-operation." Mr. Carlyle in his Presidential Address at the Calcutta Conference of co-operative credit a few weeks ago, drew attention to the need for the formation of distributive societies, and it may be hoped that, through the combined efforts of the Registrars and the outside public, this form of co-operation will, in the coming year, be established. After all, co-operation is a principle and *not* a method and, as Mr. Wolff has repeatedly emphasised, it is a suicidal policy to lop off its limbs which cannot live by themselves. Agriculture, distribution, production, banking, insurance—all are embraced in it and are interdependent and in what measure we encourage the establishment of these several forms, in such measure shall the agricultural classes—specially the lowest strata of the community—be benefited.

I must now pass on to a consideration of, a different kind of organisation,—such as has been devised for providing *real* credit to the big landowners who may be in need of financial assistance, but who cannot be served by the

limited funds of a Co-operative Credit Society. The Banks instituted for this purpose are known throughout Europe as Land Banks,—the most important feature of their work being the making of advances on mortgage security. There are three main classes of these Banks: (1) Private Banks, (2) Government Banks, and (3) Private Banks under a Government guarantee.

The Private Land Banks, such for instance as the *Landschaften* of Prussia and the Credit Foncier of France, are organised by the landowners themselves on the debenture plan. They raise their money by the issue of long-time debentures secured by their own capital and by the mass of mortgages that they hold. Loans are made for a long period of years on the security of mortgages and repayments are made by annuities covering the interest and part of the principal. The *modus operandi* by which landowners can obtain loans from the Bank is thus described by Mr. (now Sir) Frederick Nicholson in the Madras Blue Book :

“ The landowner presents his demand for a loan, his title-deeds are inspected, his property valued, a loan, repayable by annuity, agreed upon to one-half or two-thirds of the estimated value, and a mortgage-deed executed and registered, the bank then issues its debentures either handing them to the borrower for sale or selling itself and paying their proceeds to the borrower ; the face-value of the debentures exactly represent the loan,—any premium due to a good market (*Kursgewinn*) being credited to the reserve, so that the mass of bonds issued to the public represent simply the value at any time existing of the mass of mortgage loans granted. The mortgagor at the specified period pays into the bank the interest and amortisation amount due on the loans ; the bank carries the payments separately to the heads of interest and amortisation, and with the accumulated masses of the latter received from its hundreds or thousands of debtors, it pays off forthwith an equivalent amount of its debentures. Thus, if a thousand loans are granted for a total of a crore of rupees for an average of forty years, the debentures—of all sorts of amounts, including many of very small value—issued to the public, will also be for a crore, and may be held by ten thousand or more persons varying in number as the paper changes hands ; every six months the fixed dues which include sinking fund and interest are paid in ; the sinking fund beginning perhaps at $\frac{1}{2}$ per cent. or Rs. 12,500, and gradually increasing each year as the principal

is paid off, and as the charge for interest, therefore, decreases; this sum will be used by the bank in redeeming its debentures to that value, the particular debentures to be redeemed being determined by lot, or by purchasing them in open market, should they fall below par. The interest paid in by the ten thousand borrowers is, of course, carried to the interest account, and the cost of administration is met by an addition of about 0.5 per cent. to the annuity, any profit being credited to the reserve."

Banks of this nature, adopting the debenture system, have been doing a very large business throughout Europe and the debentures of these Banks have generally a high standing in the money markets.. Governments exercise over them a careful supervision and control, and such supervision is necessary. Their great drawback is that they offer great facilities to the landowners. If this can be guarded against under proper checks and restraints, such a Land Bank seems the best form that can be adopted for this country.

The second class of Banks are the Government Banks which are financed either entirely or largely with Government funds, and in the management of which the Government largely participates. The 'Credit Agricole' of France are examples of this class. The bulk of the loans is made on mortgage security and funds are raised usually by the issue of Government bonds. The Banks are administered by Government officials, and loans are made usually for a considerable term of years. A few such Banks exist in some of the petty States of Germany, in Australia and New Zealand and are performing a useful service to agriculture. The earlier attempts in France, Belgium and Italy proved to be failures. Mr. Nicholson, from whose work I have already quoted and who is by far the best living authority on the subject, sums up the experience with Government Banks thus:—
"The history of rural banking shows that no State bank has ever yet succeeded, except in very petty States, where the administrative staff is out of all proportion—relatively to large States—to the work to be done and the area to be

covered by it, or where the communes are linked to the central organization by peculiar arrangements, or where the banks are not credit banks at all, but mere offices of issue of loans either upon the results of the inquiries of special Commissions, as in the case of the German rent charge banks, or upon the security of communal organizations which deal with all details, as in the case of the Russian Peasants' Land Bank, founded to enable the ex-serfs to buy out the land settled upon by them. There are no State land banks in great States dealing with the continuous yet fluctuating credit required by a cultivating peasantry."

The third class of Banks are those financed with private capital, but under Government guarantee. The most successful of this type of Institution is the Agricultural Bank of Egypt established by Lord Cromer in 1899, as the result of an attempt on the part of the Egyptian Government to aid agriculture. At first it limited its loan operations to one district. In 1900, it extended its operations to 10 districts and now it deals with the whole country. It utilises the services of Government tax-collectors in the collection of its loans and enjoys a Government guarantee of principal, and of interest at 3 per cent. on the capital invested in mortgage and agricultural loans. These privileges ensure the raising of the required capital on comparatively easy terms. The Bank issues two classes of loans,—“A” Loans against receipt and “B” Loans guaranteed by mortgage security and repayable over a period of years. From a business point of view its operations have been very successful. It pays good dividends every year and has accumulated a substantial surplus. It has done immense good to the fellaheen (Egyptian peasants) by providing them with banking facilities, besides setting free a large amount of money which had been locked up.

If we analyse carefully the Egyptian system, we shall find that it is nothing more than an organised development, *not of joint personal security* but of agricultural loans.

It has little to do with co-operation and is unsuited to the requirements of the small farmer. Mr. Nicholson thus refers to the Egyptian plan in his "Note on Agriculture in Japan."

"The fact is that, so far, exclusive of direct Government loans which are neither very successful nor possible, only two ways have been discovered of financing the small peasant farmer;"—and India in spite of its peculiar systems of land tenure is a country of small holdings—"one on the European continent by village banks of the Raiffersen or Schultz-Delitzsch type financed at first from private funds (either members' deposits and loans or from outside) or from various banks (popular, savings joint stock, etc.), until they are numerous enough to support central lending banks of their own; the other, in Egypt, on a plan modified from the Scotch banks, where a rich central bank organises a great lending system through numerous inspectors and is permitted to use both the Government village organisation, village knowledge, village land records, and local treasuries, for the issue and recovery of its loans. The former is, in the writer's opinion, decidedly preferable as it fosters self-help and avoids Government intervention; the Egyptian plan which requires higher interest is a quasi governmental organisation, and is apt to prevent the formation of local credit associations."

It will thus be seen that a Central *Co-operative* Bank on the Egyptian plan, which we see now and then advocated in the press, is a contradiction in terms. For providing *personal* credit, the co-operative system of banking is the most effective. For *real* credit a Land Bank is urgently needed and I trust that as the result of its deliberations, the Conference will be able to formulate a scheme. Whatever form of organisation it may be, it should, if it is to be of any real service to the country, be as far as possible independent of Government and should be run on perfect business lines. In the revival of agriculture, organised charity may seem to do much, but it is organised credit that will do more.

TANNING AND LEATHER MANUFACTURE.

BY D. N. ROZDON, ESQ.,

Managing Proprietor, Boot and Shoe Factory, Amritsar.

The process of tanning consists in the conversion of the skins of animals into leather, by chemically combining with the substance of the skin, an astringent vegetable principle called tannin, or tannic acid ; and in order to thoroughly understand why this conversion takes place when skins are immersed in a solution of the tanning principle, we must know something of the chemical composition of the skin itself. When the cuticle or scarf skin has been removed from the cutis or true skin, it is found that the latter is almost entirely soluble when boiled in water, and the solution after evaporation and cooling, sets into a jelly ; this is gelatine, a substance, which readily combines with tannic acid.

In India from time immemorial this art was conducted chiefly by the judgment of uneducated workmen and the article produced could scarcely be called leather in the strictest sense of the word. Up to about 60 years ago, the tanners were men of small means diffused throughout the country, unaided by railway communication and the advantages of machinery, being utterly devoid of any knowledge of chemical principles. As a contrast to this condition of the ancient trade, we have now a number of extensive tanneries, many of which are situated in our big cities such as Bombay, Calcutta, Cawnpore, and Madras. In some of these, the principles of the art are not only understood but more or less generally followed, while the advantages of labour saving machinery have been recognised and mechanical appliances adopted which the tanners of old would have looked at but to condemn.

In spite of all this progress, the raw hides and skins in India still labour under great disadvantages, owing to the village sweepers and the butchers not handling the

carcases, &c., carefully with a view to the future operations to be undergone by the raw material. I have observed it too often that the hides or skins of animals slaughtered as well as those that have died from natural causes, are not at once taken off, but left for days on the carcase. This is in the highest degree detrimental to the hides, as they acquire thin and defective spots through decomposition going on in the carcase or the worms which are forming in the interior of the animal work destructively on the hides. Great damage is also caused, although not of so serious a nature, if in flaying the work is not done with due care. The bits of flesh and fat which are too often allowed to remain adhering to the hides and skins, become at once decayed and communicate decay to the skin, which is injured or eaten away in spots, becoming consequently, very thin, or even worn into holes. Such damage is noticeable more especially after manufacture, when the leather is found bad in appearance or pitted with dark spots as in the case of coloured leather.

In view of these evils and in order to promote the interests of leather trade, it is desirable that a small allowance should be paid to the village sweepers, chamars, or butchers for careful flaying and performing their work with extra, that is proper care. The benefits that will accrue to the whole leather trade by following such course cannot be rated too highly, for not only will it secure a serviceable material to manufacturers, but also a large quantity of hides and skins will be saved from destruction and the market will be better and more fully supplied. A further consequence will also be that a better manufactured article will be produced and lower prices established.

In softening hides and preparing them for the process of tanning, a great deal depends upon the judgment of the person superintending the operation, inasmuch as the diversities in the qualities and characteristics of the

hides render it impossible to subject them to any hard and fast rules fixed once for all. To green hides particularly, nothing can be more injurious than to suffer them to remain too long in weak 'ooze.' They become too much reduced, grow soft, flat, flabby, and lose a portion of their gelatine and refuse to plump up. On the other hand the effects of an early application of, 'ooze' that is too strong and too warm to green hides is very injurious. It contracts the surface and fibres of the skin, tanning at once the exterior layers so, 'dead' as it is termed, as to shut up the pores and prevent the tannin from penetrating the interior. This renders the leather harsh and brittle.

When I first learnt my trade and began my operations at the old fashioned local tannery in 1897, the great improvement in weight seems to have been gained by the judicious use of strong liquors or 'ooze' obtained from, finely ground bark and by skilful tanning. In order to produce heavy weights, the hides should be tanned quickly with good strong liquors, particularly in the latter stages of the operation.

If we look abroad, on the instruments of husbandry, on the implements used in most mechanical trades, on the structure of a multitude of engines and machines; or if we contemplate the necessary parts of our clothing, shoes, boots, gaiters, and gloves or the furniture of our houses, the books on our shelves, the harness of our horses and even the substance of our carriages, what do we see but instances of human industry exerted upon leather! What an aptitude has this single material, in a variety of ways, for the supply of our necessities and convenience in every state and stage of life! Without it, to what difficulties should we be exposed?

Is it not a matter of great pity that in this Province this industry is being neglected, although it is an admitted fact that the demand for superior boots and shoes for the use of middle and upper classes and for the supplies of the native States as well as for good harness,

saddlery, and accoutrements is exceedingly large with a steady upward tendency, and the present arrangement is hardly adequate to meet the increasing demand. This, therefore, furnishes a strong and permanent basis whereupon this industry can be established; while on the other hand, the fact, that the raw hides and skins as well as tanning materials are in abundance in the country and the resources are plentiful and rich, combine to give a further assurance of positive success in the industry.

It must also be noticed that the export of raw materials and skins is at present swelling to an enormous amount in our Province, and unless steps are taken to encourage and foster the leather industry, the drain upon the country's resources will be inevitable. For the above reasons it can be safely and confidently commended to the support of the capitalists and the general public as containing all the essential elements of a profitable and successful business.

WOOD CARVING IN THE PUNJAB.

BY SARDAR BAHADUR RAM SINGH,

Principal, Mayo School of Art, Lahore.

Wood carving is a very old art and appears to have been practised from immemorial ages, one evidence of which is that in Hindu houses, entrance doors have always been prepared with great care and labour, and at a great cost of time and energy. In some cases workmen used to be set to making entrance doors two years before the building itself commenced and the whole front of that house was sometimes made of carved shisham or beri wood. Before the time of Akbar, when the art was much in vogue, the style practised was distinctly Hindu. But the oldest style, examples of which used to be lately met with, in Lahore and other towns of the Punjab, was the well-known Akbari style. Entrance doors, bukharchas,

sets of which are called "Tindara" (three archades) and other articles, such as, ceilings, beams, rafters, joists and furniture, etc., used to be of carved wood. But some time about the middle of the 19th century, wood carving came to be neglected and whenever old houses fell down, wood work, though in most cases, beautifully carved, was not taken enough care of and was allowed to be destroyed—burnt as fuel or otherwise. Some old examples of this art, however, were preserved and are to be seen now in the Lahore Museum. They are believed to be rescued when the Lahore water-works were commenced and bazaars were widened.

This style was a mixture of the Hindu and Persian styles. Pure Hindu style is hardly seen anywhere in the Punjab, except in old Delhi, where carving was practised in stone, not in wood. At Delhi and other places where stone was used, only door leaves used to be of wood and every other thing the door-frame, etc., was of carved stone. The Punjab having not much stone for building purposes substituted for it wood and architectural wood carving became a distinct art. Pure Hindu wood carvings are not now available, and could not naturally be preserved so long. With the advent of the Mohammadans, the Hindu workmen, working under Mohammadan masters, produced a mixture of the Hindu and Persian styles called the Akbari style.

For carving shisham, beri, phulahi and deodar woods are used, these only being most suitable timbers for building and architectural purposes. Deodar being a soft wood was not used so frequently as the other three. Amritsar, Bhera, Ludhiana, Sunam and Payal (in the Patiala State) were other well-known centres besides Lahore of this kind of work, while ivory inlaid work was practised in Hoshiarpur and metal inlaid work in Chiniot. An exceptionally fine example of wood carving of the time of Maharaja Ranjit Singh is the coloured ivory inlaid work of entrance door of the Darshani Deorhi of the Golden Temple at

Amritsar. There were other fine carved wood doors made in or about the time of Maharaja Ranjit Singh for the Golden Temple, but they were substituted later on by golden doors.

As mentioned before, when wood carving was very much neglected, fortunately, the Mayo School of Art was established at Lahore, and it was decided that Indian Art only should be practised and taught there, for which we are highly thankful to the Government. But for this timely help, wood carving would have died out to rise no more. This gave a very great impetus to the art of wood carving, and artizans of the Amritsar district which is now the centre of the famous Sikh style were greatly benefitted. Indeed the very large improvement in and the successful spread of the art of Amritsar workmen is due to the Lahore School of Art. And this Sikh style is not confined merely to the Amritsar district or to the Province of the Punjab, but has spread to the far and distant places like Lucknow, Agra and Jeypore also, where the same style is followed in stone carving.

The Lahore School of Art made a passage in Pinjra work (Geometrical Tracery) for the Duke of Connaught, Surrey (England), a Billiard room and anti-room with a ceiling of carved wood, parrots and other figures, during the time of Mr. J. L. Kipling.

The Patiala Durbar Hall is also an example of the work of the Art School. Its ceiling is unparalleled for its extent and design.

The doors in Akbari style are also made for the Kapurthala Durbar Hall where a whole room is ornamented with carved wood work, dados, balconies and plaster work.

In the Dining and Drawing rooms, as also in the Council room of the Government House, Lahore, carved dados, windows, and doors have also been made quite recently, which would form another example for the future students to follow. A very big screen has also recently

been made in carved teakwood to partition the Ball room of the Barnes Court, Simla.

Thus the Art School has set examples and is turning out workmen, in its passed pupils, who will take the Art to their homes and will keep it alive. The examples are before them and it is hoped, they will be found extremely useful by the present and future students.

A feature of the training imparted in the Art School is that students are first made to design the thing, then they are made to make models in clay and then copy them in wood. This was the method of work with the Greek and is new to India, where work in wood follows the design immediately. But the system introduced has proved very useful, since it gives a bold and refreshing touch to the work.

In addition to teaching the students artizans from Hoshiarpur and other places are given designs, and instructions how to work and their work is checked from time to time. This has improved the work of the artizans who came under the influence of the school. There are still found some men in Amritsar whose profession is wood carving which is all due to the School of Art.

Charts for Pattern books on the Punjab Wood Carving have been made in the School of Art and reproduced in the Lithographic office, Calcutta, which the Education Department has very kindly consented to distribute, free of any charge, to artizans and technical schools in the Punjab.

COCOANUT OIL AND COIR INDUSTRY.

BY R. R. NABAR, ESQ., B.A.,

Bombay.

I am going to place before the Conference very briefly, the future prospects of an Industry, which, if fully developed on modern scientific lines, has a large scope before it, but which, owing to shyness of Indian capital, enterprise,

and scientific knowledge, has still remained primitive in its methods in this country, and is, therefore, threatening to pass into the hands of foreign capitalists if we neglect it any longer.

The Indian region of the cocoanut is the lower basin of the Ganges, the Brahmaputra, the Malabar, the Coromandel, and the Konkan coasts, but the Malabar coasts and the Lakhdive and Maldive Islands are pre-eminently the seats of the Indian Cocoanut Industry. To give only a slight idea of the vast production of the cocoanut, and the enormous industry and trade in oil and coir, and the vast employment it promises to open out to the capitalist, the labourer and the merchant, I give below a few figures with the help of Watt's Dictionary of the Economic Products of India, and the last report No. 7 issued by the Commercial Intelligence Department of the Government of India for the seven months from the 1st of April to 31st October of the years 1907, 1908—1909.

In India alone, there are about four lacs and eighty-thousand acres under cocoanut cultivation, with an average of 100 trees to an acre. Thus, there are about four crores and eighty lacs of trees in this country. The best kinds of trees yield about 200 and the worst about 50 cocoanuts each, per year; but the annual average of cocoanut yield for each tree, can be safely taken at 75 cocoanuts. At that rate the number of cocoanuts produced in India comes to the enormous total of 360 crores every year. Each tree again can yield about $2\frac{1}{2}$ gallons of oil and $7\frac{1}{2}$ lbs of coir (taking 10 nuts for 1 lb. of coir on an average). Thus, taking for granted that the cocoanut kernel is not used as food, and the husk is not burnt as fuel, the total production per year of oil and coir in this country, would be something like 900 crores of gallons and 32 lacs of cwts., respectively. Taking roughly Re. 1·43 per gallon of oil, and Rs. 10·37 per cwt. of coir, as the price, the values of the annual production of oil and coir alone, mount up to the fabulous sums of Rs. 1,237

crores and Rs. 31/3 crores, respectively, irrespective of other by-products from the same tree, if the manufacture be established on an extensive scale. These figures do not include Ceylon.

In order to show the great importance of the cocoanut as one of the principal articles of commerce, it is necessary to give figures of exports and imports. But the mere returns of trade cannot give a right conception of the importance of a product like the cocoanut, which to a very large population, may be said to be their source of wealth, as well as their food, drink, and occupation. Consequently the export trade must be much smaller than the home consumption, and this is actually the case as will be seen from the figures given below; the value of this export, however, can be many times increased, if both the oil and coir, before export, are refined and made into more finished articles, such as Cocoabutter, Candles, Soaps, Mattresses and other manufactured articles.

EXPORT

QUANTITY.

VALUE (RUPEES).

	Seven months, 1st April to 31st October.			Seven months, 1st April to 31st October.		
	1907	1908	1909	1907	1908	1909
Cocoanuts No.	53,212	1,72,750	78,311	2,154	7,263	3,078
Kernel, or Copra cwts.	89,842	1,40,035	3,33,406	17,12,792	18,39,617	42,55,503
Oil (gallons)	7,77,144	17,46,250	12,74,854	11,38,700	25,06,214	18,27,557
Coir cwt.	5,796	3,663	3,094	54,779	38,263	32,094
Total Rs.	9,25,994	20,62,698	16,89,665	29,08,425	43,91,357	61,18,232

These figures are only for seven months of each year and they tell their own tale. There is a steady and rapid rise in the volume of exports. In 1907, the total value of the exports of Cocoanuts, Copra, Oil and Coir was Rs. 29 lacs. In 1908, the same increased to Rs. 43 lacs, *i.e.*, by more than 150 per cent. and in 1909 the same rose steadily and in the same proportion to Rs. 61 lacs. Thus, in two years, the value of the export trade is more than doubled. Again the exports of cocoanut fruit alone have risen during the same period by 142 per cent. Copra by 253 per cent. and Oil by 163 per cent. Coir has fallen to 59 per cent. and in the inverse proportion to the exports of cocoanut fruit. Thus the greatest rise is in the raw materials, which are Copra and Cocoanut fruit. This shows that those foreign countries which are our customers, prefer to purchase our raw materials because they wish to provide employment to their own capital and labour and thereby, get a larger return on them. Consequently, so much Indian capital and labour remain unemployed which, with enterprise and scientific methods, would find employment and yield profits to our people.

Looking to the countries which import these products our chief customers are Germany, England and the United States of America. During 21 months of the last three years, Germany purchased 22 lacs, England, 12 lacs, and the United States, 9 lacs. Other countries bought only 11 lacs. Germany is thus our greatest customer, taking about 38 per cent. of the total value of our exports, and this proportion is likely to be still greater in future, considering the fact, that, of all the modern civilized nations, she is the only country where chemical industries are developed to the highest extent.

If we compare these export figures, with the figures of production already given, some idea can be formed of the enormous consumption of cocoanuts, oil, and coir in India.

For the sake of manufacture, the cocoanut can be

divided into four distinct parts : (1) The outer husk, out of which bristle or coir is made ; (2) The kernel or kopra out of which oil is expressed ; (3) The intermediate shell, and (4) the sweet water. The first two, are commercially of great importance, while the latter two, are of secondary importance only for giving out by-products, if manufactured on a large scale.

(1) The husk is removed from the cocoanut by a primitive implement and though it is done quickly, yet in comparison with modern machinery, the process is necessarily slow and wasteful of much labour and time, and more costly. The method of converting the husk into coir is quite primitive and wasteful as will be seen from the excellent extract I give below, from the pen of Mr. V. Desikachari which has just appeared in the journal of the Indian Merchants' Chamber, Volume 11, No. 6, page 170. He says :—

“The cocoanut fibre or coir industry is a very prominent item making up the commercial wealth of Malabar and Travancore. Though there are other great centres of cocoanut production in Southern India, Malabar has certain natural facilities in its possession of many briny back-water lakes, suitable for the manipulation of fibre extraction, which the other sister districts of Southern India do not possess.

The cocoanut bristle when divested of the shell and nut, is usually taken in boats to these back-water lakes and dumped down and stacked under the brine and amidst the slime and slush on the bed of the lake. This immersion lasts generally for more than three months when the stuff gets pulpy and loose by the caustic action of the liquid. The stuff is now hauled up, threshed and cleaned and put to dry. This is invariably the process practised in Malabar which will be found as unprofitable and risky as it is primitive in its methods. First we have to depend solely on the wind and weather as the immersion could be accomplished only in certain periods of the year. This

impairs the course of the business. Secondly, it not infrequently happens that a rough sea scatters the immersed stacks and the final recovery of the stuff is never more than 50 per cent. of the initial output. Thirdly, owing to the uncertain nature of the reducing agents in the slime and brine, a considerable portion of the fibrous stuff gets too rotten to be useful. Fourthly, the immersed stuff gets a peculiar stench and stain which bring down the market value to a bad discount. In order to do away with all this risk, inconvenience and loss, I have formulated a chemical process with good experimental success which should give the maximum quantity of the fibrous stuff devoid of any foreign stench and colour and in its best strength. The manipulation does not take more than three days' time and is entirely independent of wind and weather and slime and brine. The cost of the manipulation is very cheap as the chemicals employed will not cost even as much as immersion labour. A smooth and uniform business is easily ensured and the fractional moiety of whatever capital is at present involved, can easily carry on the business. Apart from all this, the very prominent advantage of using the dry stuff as satisfactorily as the wet stuff which only is at present treated for immersion is evidently making a double success of the trade. A patent of the process will keep the industry in our own hands for a considerable time. The plant or machinery and other accessory fixtures will cost about Rs. 15,000 which, with a working capital of Rs. 10,000, will bring our manufacturing capacity of 10 candies of 600 lbs. every day of 10 working hours, making up an out-turn of 250 candies per month, of 25 working days. The lowest profit (approximate) per candy comes to Rs. 10 making up a monthly profit of Rs. 2,500 per month. Salaries of staff and labour and other office miscellaneous expenses come to Rs. 1,200 giving us a net profit of Rs. 15,000 per annum."

The Indian export to European countries, is of crude coir, but by means of ingeniously constructed machinery,

the fibre is rendered sufficiently fine for the loom. Matting of different textures and coloured figures is produced, while a combination of wool in pleasing designs gives the richness and effect of hearth-rugs and carpeting. Besides these, coir has been found suited for a variety of articles of great utility and elegance of workmanship, such as table mats, fancy baskets, bonnets, articles for household and other purposes such as brushes, and brooms, matting for sheep-folds, poultry-yards, church cushions, hammocks, clothes lines, cordage of all sizes and strings for nurserymen and others, for tying up trees and other garden purposes; nose-bags for horses, mats and bags for seed-crushers, oil-pressers and candle-manufacturers are only a few of the varied purposes to which the fibrous coating of the cocoanut is now applied. The price of these article is many times more than that of the coir, out of which they are made. As these articles are made in foreign countries the capitalists and the labourers employed in manufacturing them, get the profit and remuneration which really ought to remain in India.

The qualities of the coir rope are excellent and are appreciated throughout the world, especially its elasticity and strength. To these properties, has to be added its great power of withstanding moisture even under continued actual submersion. On these grounds it is in great demand for maritime purposes, such as hawsers. It is durable and little affected when wetted with salt water. Numerous instances have been related of ships, furnished with this light, buoyant and elastic material, riding out a storm in security, while the strongest made, but less elastic ropes of other vessels have snapped in two. Cochin in Southern India is noted as the port of shipment for the best quality of coir yarn. The consumption of coir is also enormous in India as the coir rope is universally used in the construction of bamboo huts.

(2) Now we come to the Kernal or Copra ; this is the most important part of the cocoanut fruit, as oil, which is

one of the chief articles of diet of the Indian people and one of the principal articles of export, is extracted from it. Copra also enters largely into the food of the Indian people like the cocoanut oil. When copra is separated from the cocoanut, it is left to dry in the open fields for several days until all the water has evaporated. But in doing so, it gets mixed with dust, sand and other impurities and even sometimes with germs of many diseases. Consequently the oil is quite impure and unfit for consumption; it has therefore to pass through a process of purification which adds to the cost of the finished articles. A Frenchman has recently invented a scientific process by which copra can be dried in a short time, without being exposed to the Sun. The process is very cheap and simple. The oil presses in India are quite old-fashioned and therefore the percentage of oil extracted is nearly 10 p.c. lower than that expressed in Europe. To every 100 lbs. of dried Copra, we in India obtain 55 lbs. of oil, while in Europe they get 65 lbs. So there is a loss of nearly 10 lbs. of oil for every 100 lbs. of Copra. I have already shown from the export returns for only seven months, for every year during the last three years that there is a rise of 253/100 in Copra and 163/100 in oil. This shows how the export trade is capable of expansion. I have already shown also that this rise is due to the expansion of chemical industries in Europe generally, and in Germany particularly. In Europe the oil is now principally converted into Cocoa butter, which is at present the most refined form of this oil. It possesses almost all the qualities of ordinary ghee and is as cheap if not cheaper. It is fast taking the place of lard for the culinary or edible purposes in Europe. It provides bakers and biscuit manufacturers with a substitute for butter, which is not only pure and cheap, but even better suited for baking purposes than butter, proper. It does not readily become rancid. It has been recently authorised for culinary purposes in the French Army which is significant of the

future demands for this article all over the world. Confectioners are said to find this butter an entirely satisfactory substitute for more expensive cacao butter, the imports of which into England, have consequently declined. For this reason it is tinned and sent all over the world. The price of oil in India is nearly Rs. 23 per cwt. while that of cocoa butter, in Germany is Rs. 41 or so, per cwt. This high price of the highly developed form of oil is due to the scientific treatment accorded to it, and unless India does the same, she will fail to employ her capital and labour in the most profitable way in the manufacture of those raw materials with which nature has so plentifully supplied her. The lower grade of oil is used in making soaps and candles. In India the oil is used principally in cooking, soap and candle making, and anointing the body.

The remaining portion of Copra after the oil is extracted is called Poonac or Cake. It is exceedingly valuable as manure for cocoanut trees, and is also largely used to fatten fowls, pigs, cows, and other animals, and is exported in large quantities to Europe.

(3) The internal hard nut or shell immediately beneath the husk, is the third portion of the cocoanut. It is largely used here as fuel, but it is also made into bowls, cups, water holders of hubble-bubbles or hookahs, ladles, powder boxes and other vessels for domestic purposes. Like the Coir, the shell is little affected by water. It is very hard like the oyster shell and therefore, if treated by proper machinery, it can be made into very cheap and nice buttons, toys and other small articles of common use. A factory is already started in Bombay for this purpose.

(4) Lastly comes the sweet water. It can be made into sugar, sauces and sweet beverages of various kinds.

There are many other by-products which can be manufactured out of the cocoanut, if a large mill with a proper scientific laboratory attached to it, is started in India. Though they are of small commercial importance

they ultimately go too much to reduce the cost of production of the chief articles. They are too numerous to be described at length in a short paper like this.

SOME ADVANTAGES IN FAVOUR OF THIS INDUSTRY.

In connection with this industry there are certain advantages which I should like to enumerate briefly before I close my paper.

(1) The Indian cocoanut is the best of its kind in the matter of oil and coir yielding properties, and therefore, like the Egyptian cotton has practically a monopoly in the World's market.

(2) The crop is available four times a year at a short interval of three months and so the mills and other works need not be closed like those for expressing cotton seed oil where the crop is only once a year. This is very economical in running a mill.

(3) The cocoanut crop is more independent of the vagaries of the monsoon than cotton, wheat, &c., consequently, the prices do not much vary and, therefore, will not disturb the continuous working of the mill.

(4) The raw material is very cheap in comparison with the price of the very finished articles, such as cocoa butter and the manufactured articles of coir.

(5) Labour and fuel are cheap and plentiful.

(6) Cocoanut trees being along the sea-coast, cost of carriage, both for raw and finished articles will be the least.

(7) The amount of capital required for starting a large mill with all the latest appliances for turning out all the abovementioned finished articles will be comparatively small, that is, only a few lacs.

(8) The market is certain, both for raw and manufactured articles, both at home and abroad.

Certain defects which can be removed easily :—

(1) Introduction of modern machinery on larger scale and more scientific methods in the place of antiquated and wasteful ones.

(2) Establishment of Techno-Chemical Laboratories like that of Prof. Gajjar in Bombay in connection with the oil and coir mills to find out how bye-products can be made out of waste materials ; this will ultimately reduce the price of the chief articles such as cocoa, butter, etc.

NOTES ON THE ARTS AND INDUSTRIES IN KASHMIR.

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If Kashmir is replete with all the beauties Nature can concentrate on any one spot, it is also the storehouse of exquisite arts fostered by a people ingenious, artistic and wonderfully applicant, with nimble and industrious hands and probably taught by the beautiful Nature around them, to harmonize colours and produce exquisite designs. If the natural beauties of Kashmir elicited the rapturous expression of man's admiration, its arts did the same ; for were not the shawls of Kashmir unrivalled in Europe and Asia and did they not excite the wonder and admiration of the world for their elegance in taste and design and the softened harmony of their colours. True merit never goes unrewarded ; for this shawl trade alone, once upon a time, employed over 60,000 people who lived in affluent circumstances and brought into the country 50 lakhs of rupees annually.

But the country and its bountiful resources are there and the modern Kashmiris have not yet lost their artistic instincts and manufacturing skill. If its arts can be revived and if its industries can be developed and improved, under modern methods, it may regain its past glory and its people can be restored to their past prosperous condition.

SHAWLS.

Kashmir is famous for its shawls from remotest antiquity. When Krishna went to the court of the Kurus, as

a delegate from the Pandus, the present of Dhritarastra to him included ten thousand shawls of Kashmir. We are also told that ere Tyre became a place for fishermen to dry their nets, the Hindoo-Phœnician commerce had an Asiatic renown, the spices of India were sought in the time of Solomon, the gossamer muslin of Dacca and the shawls of Kashmir adorned the proudest beauties at the court of the Cæsars. In Judges v. 30, we read of divers colours of needlework, on both sides, and in Ezekiel mention is made of embroidered works brought by merchants in chests of rich apparel bound with cords and made of cedar apparently referring to Kashmir Shawls. Be that as it may, we find authentic records of a large trade in shawls in the time of Akbar in the *Ayeen Akbari* of Abul Fazal. "His Majesty," Abul Fazal says, "is very fond of shawls. By the attention of His Majesty the manufacture of shawls in Kashmir is in a very flourishing state." Bernier, who visited Kashmir in 1665 A. D. with Aurangzebe, says "what may be considered peculiar to Kashmir, and the staple commodity which particularly promotes the trade of the country and fills it with wealth is the prodigious quantity of shawls, which they manufacture, and which gives occupation even to the little children." In the year 1739 Nadir Shah despatched an ambassador to Constantinople with fifteen elephant loads of presents to the Sultan amongst which a number of Kashmir shawls played a conspicuous part, and which the Sultan presented to the wives of the ambassadors in his court.

It is said that loom shawls were first made in the reign of Zain-ul-Abidin and were accidentally invented by Nakad Beg, a weaver who, while weaving a plain shawl, cut his finger and the drops of blood fell on the thread and produced a red and white pattern which suggested to the weaver the use of dyes. This was shown to the great king Bud Shah, another name of Zain-ul-Abidin, under whose patronage the loom shawls began to be manufactured. From this time shawls were in great demand

in foreign countries, specially in Persia and afterwards, during the Mogul times, in India. A great impetus was again given during the Afghan rule in Kashmir by Sirdar Aziz Khan, in whose time the income from shawls was 4 lakhs of rupees, from Mahalat Nagdi (tax on trades) 3 lakhs, and from Jowahir Bazar (Silver Jewellery, &c.) 7 lakhs of rupees. The shawls manufactured in the Afghan time were (1) Kasaba (Rumal), (2) Dourdar, (3) Jamawar, and they were exported chiefly to Persia and India. Under the Sikh rule, the trade was in a flourishing condition when Dewan Kripa Ram was the governor, but an awful famine appeared in Colonel Mian Sahib's time which gave a crushing blow to the manufacture. When Maharajah Golab Singh became the ruler in 1846, the shawl trade began to revive and the income from Dagshal during 1846—1869, was on an average 7 lakhs of rupees per annum. It was at this time that there was a great demand for shawls in France and other European countries. Larousse says "In spite of heavy duty levied by the French Government, 110 Fr. on a piece whatever its value, the trade flourished."

During the famines of 1832 and 1878 a large number of shawl weavers left Kashmir and settled in Amritsar and Lahore where, up to this date, their descendants weave shawls.

In Maharajah Golab Singh's time and also in Maharajah Ranbir Singh's time 38,000 people were engaged in shawl weaving and the export of shawls valued on an average 28 lakhs of rupees per annum.

Moorcroft, who visited Kashmir in 1822, says "the whole value of shawl-goods manufactured in Kashmir may be estimated at about thirty-five lakhs of rupees per annum."

The Franco-German war of 1870 and its disastrous consequences inflicted an almost mortal injury on the flourishing shawl trade, and the little flickering life which remained was practically extinguished by the famine of

1878 and 1879. Maharajah Ranbir Singh nobly coped with the famine and advanced 10 lakhs of rupees to the shawl manufacturers, but the shawl trade never recovered from the shock.

Sir George Birdwood says "The Cashmere trade in shawl has been ruined through the quickness with which the caste weavers have adopted 'the improved shawl patterns' which the French agents of the Paris import houses have set before them."

The shawl trade was controlled by a Department called "Dagshawl" or shawl marking Department. It existed from the time of Yusaf Khan the Chak ruler (1582 A. D.). This Department supervised raw materials, dyeing and the whole manufacturing process, settled all disputes among manufacturers and put the State Seal on all shawls manufactured. It collected the poll-tax on weavers, and an impost on the manufactured article. Pandit Raj Kak was a famous Dagshawl officer in Maharajah Ranbir Singh's reign and was able to collect 13 lakhs of rupees per annum as Dagshawl income. His death was much deplored by the shawl manufacturers. Maharajah Ranbir Singh gave a great impetus to the manufacture of shawls and some of the best shawls were manufactured by his orders between 1865 and 1872.

The shawl-wool of which Kashmir shawls are made is the down of the Tibetan goat growing under their outer hair coating in winter. These are of two kinds—Pusm and Asli Tous. In 1817, the price was Rs. 15 per 6 Seers or a Trak when the import was 60,000 maunds. The Pusm was imported by Mogal merchants who exchanged it for manufactured shawls and pushmina which they disposed of advantageously in Russia.

The best pusm came from Turfan and was sold in Srinagar as Turfani pusm. This pusm is probably from goats in the Tian Shan Mountains, and the principal marts of collection were Turfan and Ush Turfan and it came by caravan by the Kashgar, Yarkand and Leh route.

Pushmina is the term used for all textile fabric made from *Pusm-wool*. It is woven plain or in various patterns of European tweed and serge. The earliest and indigenous pattern is in plain white or *Khudrung* (natural colour) or white and black stripes called *Resh Pambur*. The best white pushmina can now be had for Rs. 20 per yard.

The Shawls for which Kashmir obtained renown were those in which the patterns were woven in the loom. The process of weaving is very interesting and the dexterity shown by boys in handling the stricks with different coloured threads, and promptly responding to the dictates of the *Ustad* "lift two and use red" or "lift one and use green," is marvellous. This is called *Talim*.

The *Hashia* is the border and may be single, double or triple. The *Pulla* is the embroidery at the two ends. The *Dhour* or running ornament covers the whole field. The *Koonj* is the cluster of flowers or *cone* in the corners. The *Mattun* is the decorated part of the ground. When the row of cones is double it is called *dokud*, *sekud* up to five and *tukadur* above five. A special design was used for Shawls sent to Armenia, with which country a large trade was done. This design is credited to Khodja Yusuf an Armenian who was in Kashmir in 1803.

The Shawl designs are various, chiefly conventional and some realistic. The well known Cone pattern, with flowing curves and minute diaper of flowers, is elaborated in the most artistic manner and combined with floral decorations and a maize of scrolls. It has been called the Persian Cone or flame pattern. The Cone, I think, is a purely Kashmiri idea. Some say the design was conceived from the windings of the Jhelum river and the Scrolls were in imitation of the ripples of water caused by the back flow near the bridges on the Jhelum. It may therefore be called the "Jhelum pattern." The Jigha pattern was a favourite one with the Mogals, and it is said that many Andijani weavers were brought to Kashmir by the Mogals, and settled in Srinagar. Some believe that

the Cone is really an elaboration of an Egyptian Cocus of ancient origin.

The process of Shawl manufactures are briefly as follows :—

(1) The wool is cleaned and treated with rice paste. Soap is never used.

(2) Spinning into yarn by the spinning-wheel.

(3) Dyeing. In olden days 64 different tints could be given. Lac is used as a mordant.

(4) The yarn is then adjusted for the warp and for the weft. The former is double and the latter is single.

(5) Weaving. The warp is fixed in the loom. The coloured yarn is wound round small sticks which may be about 1500 in number in richly embroidered shawls. The pattern is dictated by the *Tallim-guru*. The weaver has no idea what he has to produce, but only manipulates the sticks according to dictation. The weavers were formerly paid by counting the sticks. For every 1000 sticks 3 pies used to be the wages.

(6) Cleaning of discoloured hairs by *Purusgars*. The colour of white pushmina is confirmed by application of sulphur fumes.

The actual cost of a Rumal was as follows :—

Asulkar (wages of shawl weavers)...	Rs. 300
Commission 25 per cent. ...	„ 75
Pusm, dyeing ...	„ 75
Tax ...	„ 75
Bukh Ustad (Master's wages) ...	„ 75
Miscellaneous expenses, designing, etc.	25

Total cost rupees 625. The shawl was sold in Paris for Rs. 2,000 including insurance, freight, auctioneer's commission and other agency charges.

The following is an extract from a lecture on Kashmir, by Col. Grant, C.B., but where delivered it has not been ascertained. This lecture was found in the Shawl warehouse at New Street, London, and may be read with interest.

" I went to inspect one of the largest manufactories in Kashmir. The proprietor, a Mahommedan, employs 300 hands. His house is a handsome three-storied building, well aired and lighted, and workers are seated at their looms like clerks at their desk. I expected to see whole shawls on the looms, but, to my surprise, I found that the fine shawls are made in bits, from an inch to a foot square. These are cut out and given to tailors, who sew them together. In fact, this manufacture is like that of the finest laces, in which every flower and leaf may be made by a different person, and then given to another to be stitched together. One shawl, I purchased, has 1,024 pieces in the border alone ; the centre has probably 500 more ; and, before being sewn together, the precious garment looked like a bundle of dirty rags.

Each loom has from one to three persons seated at it, and a boy (seemingly about ten years of age) reads to the workers at the loom from a strip of paper in his hand. He calls out "two read" "two orange" "five. magenta" and so on, according to his paper. As he speaks, the worker, who has a tray at his hand filled with bobbins of every required colour, follows the direction by working in the stated number of threads. The patterns are worked up to each other, and then cut out. But what exquisite skill, what patience, it requires to put all these into proper order. What a puzzle it would be to ordinary workers. As the pattern is finished at the looms, it is rolled up horizontally with the pattern side underneath, as the threads have to be cut on the upper side. I was informed that it takes one man three years to complete a full-sized shawl, so that the cost, after all, is not so remarkable. After the bits have been sewn together, the next process is to have it washed in water from the lake. The spot chosen is a green bank by the side of a clear and placid stream, with a number of blocks of stone scattered about. On these stones the shawls are beaten, and then washed. When cleaned, the Government stamp is affixed to them, and they again pass

through the tailor's hand, after which they are finally made over to the merchant.

French patterns and new colours, such as magenta, are beginning to prevail over genuine Indian designs and colours. The dealers in shawls are most polite merchants never in a hurry to conclude a bargain, and offering, tea or cigars, over which the purchase may be agreeably concluded. They generally ask three or four times the amount they eventually take."

The articles chiefly manufactured were :—

- | | |
|---------------|------------|
| 1. Shapasand. | 4. Lasdour |
| 2. Chardour. | 5. Shamla. |
| 3. Kaddar. | 6. Choga. |

For the European market, square shawls and mantles were made.

The principal Shawl merchants were Hazi Syed Abid (Hazi Baba) Mirza Mohammed Ali, Ahmed But, Noor Din Pandit and Mustafa Hoondoo.

The present position of the Shawl manufacturer may be compared to miserable jerry huts rising over the ruins of a city of grand edifices of architectural beauty. The quality of pushm is not like what it used to be, the dyeing is imperfect, the old designs are abandoned, and cheap showy goods have taken the place of real works of art in the same manner as chrome prints have replaced master paintings in oil. Many shawl weavers have left Kashmir and settled elsewhere, others have taken to carpet-making or embroidery. The census of 1901 registered 5,037 shawl weavers in Srinagar.

The following articles are now produced :—

1. Plain pushmina.
2. Long shawls with border, palla and koonj, Ekrokha and Dorokha.
3. Jamawar, Ekrokha and Dorokha of various patterns or designs.
4. Saries.
5. Ladies' embroidered Shawls. Half shawls, with

embroiders so arranged as to show itself on both exposed surfaces when folded across the middle.

6. Capes, blouses, chogas, and dress-pieces, with needle work called *Dowkar* and *Katunkar*.

Ekrokha Jamawars still find market in Persia, Afghanistan and Hyderabad. Dorokha Jamawars and long shawls are in demand in Bengal.

The Dorokha shawls were first made in the time of Maharajah Ranbir Singh by Mustafa and Aziz Pandit in 1864. Aziz Pandit's descendant Noor Pandit is now one of the principal shawl manufacturers in Srinagar. Some have different colours and even different designs on both sides.

The other kind of work is called *Amlī*, in Kashmiri *Topa Kom*, and is made by the needle. The needle, however, is much used to give finish to the loom Shawls also. Both Loom and needle Shawls may be made in small pieces. The *amlīkar* Shawls were also in great demand and a Rūmal of best workmanship could be sold for Rs. 500. In the Museum at Srinagar there is an *Amlīkar* Shawl in which a panoramic map of Srinagar is embroidered by the needle showing the streets and houses, gardens and temples and the boats on the pale blue river.

The use of imported European wool threatens the extinction of what remains of the Shawl industry. Cheap German yarn is imported in large quantities and is used for various purposes for which pushm was formerly used. "Raffle" is made from this wool and sometimes sold as pushmina. The raffle is rough, not durable and altogether a flimsy article but, in the hands of the expert weavers of Kashmir, it is a clever imitation. Real Pushmina will last a lifetime but the life of the raffle is not more than three or four years.

It is, of course, impossible for the Shawl industry to regain its lost position. It is difficult to imagine that fashion will again turn in favour of the Kashmir Shawl. It will perhaps never be again the necessary complement

of a wedding trousseau in Europe. Fashion is a great tyrant. But there are signs in the whole civilized world of an awakening of true artistic instinct and it is being acknowledged that the traditional handicraft work of the East represents the highest perfection of art. "It provides" as a recent writer says "examples of absolute perfection, for the inspiration of that general elevation of thought and feeling, which all true students receive from the contemplation of master pieces of art and invention, without which it is impossible to excel in any human undertaking."

There is, therefore, every hope of this masterpiece of the weaver's art, with its wealth of design and artistic blending of colours, again receiving the appreciation it deserves. It may not reappear in the same form as before, but may reassert itself in another form more adapted to modern taste, which is distinctly changing into the artistic. In the history of the Kashmir Shawl there were many periods of ruin and revival, and this, I think, is the time when an earnest effort is needed and, if done in the right manner, the creation of the Kashmiri weaver's loom, may again become the most fashionable garment in Europe.

EMBROIDERY.

Embroidery in Kashmir is done in four styles (1) Amli, (2) Chikan (minute satin stitch), (3) Doorri (knot stitch) and (4) Irena.

The darn stitch used by Kashmiri embroiderers is perfect, with threads so completely blended that it is difficult to insert a pin between the stitches and the field texture. Drapings were formerly made in pushmina or silk most elaborately embroidered in artistic style.

The talent of Kashmiri embroiderers has now been turned into the direction of producing embroidered articles on drill, linen and cossi-silk in darn stitch embroidery with coloured washing silk, pushmina or wool. They are very effective and cheap and are now in great demand.

Draping, tea cloth, counterpane, table-centre, doyley, tie, handkerchief, blouse, dresspiece, cape, &c., are made and are sold very readily. About 3000 people are now engaged in this business. This modern adaptation is to be highly commended and there is a great future for this branch of industry provided it does not overstep the bounds of artistic forms, and the patterns do not run riot to which unfortunately there is now a tendency. The modern patterns are (1) Shawl, (2) Chenar leaf, (3) Iris, (4) Dragon and (5) Lhasa, in place of old conventional designs.

Applique embroideries are used in making floor-cloth and curtains by laying pieces of variously coloured cloth on the surface of *puttoo* or linen. This patch work is known as *gubba* and is done best at Islamabad.

Doori work or braiding embroidery is done on Shawls and Chogas in various designs giving a beautiful knotted appearance.

Namdas or felt rugs are embroidered in various patterns of bold floral design in different colours. The embroidery is of the chain stitch kind. Imported Yarkand Numdas are embroidered in Kashmir. These fetch more price as the material is more durable.

The wool now used in these embroideries is the imported German yarn. A cushion cover made of raffle and embroidered with this wool may be had for one rupee.

WOOLLEN AND COTTON TEXTILE FABRICS.

I. *Puttoo*.—This homespun cloth chiefly woven by villagers is well known. It is made from sheep's wool. The best *Puttoo* is made at Zaingir, a place called after Zain-ul-Abdin. It may be plain or in different patterns, striped and checked, in imitation of Scotch tweeds, this latter kind is now made chiefly at Pattan. The *puttoo* sold to European visitors is usually old and worn blanket or Looj, rubbed and washed. Such *puttoos* are softer and of thinner texture.

2. *Soot-puttoo*.—These are of woollen warp and cotton woof and are made in various patterns. They are suitable for wear in the plains of India and are now in great demand, similar mixed materials are also made with cotton and pushm or silk and pushm.

3. "*Raffle*."—A name given to the fabric woven from the German imported wool in the Kashmiri Loom, owing to its cheapness it is displacing pushmina, and being of firmer structure is preferred to Soot-puttoo. It is a most despicable production deserving wholesale annihilation.

4. The *Looi* or blanket made from Kashmiri wool is a very serviceable article. It is either *Ekbari* (One width) or *Dobari* (two breadth sewn together). The Khudrung (natural colour) is considered to be the best. The value of Loois, puttoo &c., exported annually from Kashmir is now Rs. 1,76,919.

5. The cotton cloth, used by villagers, is made in looms of primitive pattern from Kashmiri cotton wool or imported cotton wool or yarn. It is printed or dyed in Srinagar. The city people have taken to imported cloth. The value of imported cotton, twist and yarn averages Rs. 1,54,119 annually.

CARPETS.

Kashmir is one of those favoured places where the remains of ancient civilizations lie in rich strata one upon another as they have grown, flourished and sunk to decay. It connected India with Central Asia once a great seat of civilization. Strabo ("Ariana Antiqua") says, upon the authority of Aristobolus, that the Oxus was one of the largest rivers of Asia, that it was navigable, and that by it much valuable merchandise was conveyed to the Hyrcanian Sea, and thence distributed to Asia Minor or conveyed to the Black Sea for transport to the country on its borders. So Pliny affirms that it was ascertained at the time when Pompey was carrying on hostilities in the East against

Mithridates, that a journey of seven days from the frontiers of India brought the traveller to the Icarus which flowed into the Oxus ; the voyage continued along that river into the Caspian, and across it to the Cyrus from which a journey of no more than five days carried Indian merchandise to Phasis in Pontus." The trade of India was not confined to the West but extended to the Far East. Dr. Bushnell says that about the fifth century B. C. signs of an overland traffic with India by way of Burma and Assam appeared in the South West started by traders of the Sher State.

Carpets were originally made in Persia from the same wool of which the shawls were made in Kashmir. The pile carpets were made in Kashmir since a long time, and attained great perfection. The oldest Kashmir carpets were of floral design with mosques, gardens, wild animals, gliding fish, &c. The Ardabil mosque carpet has been recently reproduced in exquisite finish of workmanship. Herati carpets have also been produced. The Yorkandi patterns were imitated, also the Tree of life, the Swastica and the Trisula all according to the prevailing taste of the period. At the Delhi exhibition a magnificent carpet made in Kashmir 250 years ago was sent from Bijapore.

The Ardabil carpet in the Victoria and Albert Museum measures 34 feet by 17 feet 6 inches and contains 380 hand-tied knots to the square inch which gives over 3,25,00,000 knots to the whole carpet. It is so called from a Persian town in the province of Aderbaidjan. Ardabil is full of mosques and this famous carpet is said to have been obtained from a mosque at Ardabil. It was bought for the Victoria and Albert Museum for £. 2,000. The following is a description of this celebrated carpet :—

"The main design comprises a large central medallion in pale yellow, surrounded by cartouches of various colours, disposed on a dark blue ground diapered with floral tracery. Each of the corners is filled with a section

of a large medallion surrounded by cartouches. The border is composed of long and circular panels alternating with lobel outlines on a brown ground covered with floral embellishments, while at the summit of the carpet is a panel bearing a devout inscription tending to the inference that the carpet was originally used as a veil or curtain for a porch, and that it was the work of the slave "of the Holy Place, Maksoud, of Kashan, in the year of Hegira 946," corresponding with A. D. 1540. Mow, Kashan, on the high road between Teheran and Ispahan, was founded by Zobeide, the favourite wife of the Caliph Haroun-al-Raschid. It has been destroyed once or twice by earthquakes, but it is at present a flourishing town adorned by a palace for the Shah, many large and beautiful mosques, and a number of caravansaries and public baths. At Kashan numerous manufactories of carpets, shawls, brocades and silk fabrics are still carried on; but in 1540, when Maksoud, the slave of the "Holy Place," executed this marvellous work, admirable alike for its fineness of texture, its beauty of colour and symmetry of design, Kashan, with the rest of Persia, was under the sway of Sophi dynasty, and the town is alleged to have contained no fewer than a hundred and fifty thousand inhabitants.

The pattern of the Ardabil carpet seems to be one perfectly distinct and regular, and, even did it present some slight obscurities, the puzzle could be easily cleared up by a careful and minute analysis and dissection of the whole work by the aid of practical geometry and conventional botany."

The carpets of Kashmir, however, soon deteriorated. Twenty years ago no decent carpet was made in Kashmir. The modern craze for cheapness spoiled this as well as other works of art. The quality of the material was not equal to that of the past. The workman lost the large conception of their ancestors. The patterns lacked repose and there was not the time nor the inclination to produce the bold and highly conventional design on a ground of

extreme closeness of stitch. But the greatest evil was wrought by the importation of aniline dyes. In place of the cool harmony of colour bright magenta appeared. "The old Persian test of dropping a piece of live charcoal on to the pile to see if any traces of the injury remained after brushing away the singed top, is one we should hesitate to apply to a modern carpet."

A fresh impetus has, however, been given to the manufacture of carpets under European supervision, the pioneer work being done by Mons. H. Dauvergne. There are now 2 European factories in Srinagar producing excellent carpets of old designs; one of them gained the Grand Prix at the Paris Exhibition of 1900 with gold medal and wreath of Gold, another secured the first prize with gold medal at the Delhi Durbar. Their carpets are in great demand in Europe and America. Carpets with as many as 552 knots to the square inch are now made and silk and pashm are freely used to bring out the more delicate shadings in the designs and the stitch, which the Persian weavers use, to give their carpets density combined with pliancy, has been adopted. Inferior carpets with aniline dyes are manufactured in small factories in the city and are sent to India.

The patterns now chiefly used are copies from the illustrations of oriental carpets published by the Imperial and Royal Austrian Commercial Museum.

Sir George Birdwood writing in 1880 said :—

"As a striking illustration of the corruption of native designs under European influences it is only necessary to compare the two old Cashmere carpets lent to the India Museum by Mr. Vincent Robinson with the large Cashmere Darbar carpet exhibited by him at Paris in 1878. The two former carpets were probably made early in the last century. The ground in one is pale yellow and in the other rose of varying shades, and the floral pattern decorating it is in half tones of a variety of colors. The borders are weak, as in all Cashmere carpets, not being sufficiently distinguished from the centre, but the colouring and

general effect are so serene and pleasing that this does not really appear as a defect. The Cashmere Darbar carpet exhibited by Mr. Vincent Robinson at Paris was a typical illustration of the modern manufacture of Srinagar. The large scroll laid about its borders in such agonised contortions had evidently been copied from the shawl patterns introduced by the French houses into Cashmere about ten years ago. The wool of these modern Srinagar carpets is good, and the texture of the carpets themselves is not bad, but it is hardly possible that they can ever again be made to satisfy a critical taste. The colours introduced are not suited for the floor of a room, particularly the green, even if they were harmoniously blended. The floor of a furnished room, in which the great need is to see the furniture distinctly, can scarcely be too grave in tone, and it is evident that the Cashmere dyes are fitted only for shawls, and *portieres*, and tapestries for walls, where it is a pleasure to the eye to be attracted by lively coloring."

But the industry has been revived and the carpets now produced under European supervision do not fail to satisfy a critical taste.

The manufacture of carpets is capable of great extension, and has a great future before it.

PAPIER-MACHE.

This is an art which Kashmir can claim as peculiarly its own. It was introduced into Kashmir from Persia, the first batch of workmen came under the leadership of Aziz Mogal, the Great Grand father of Safder Mogal, who is dead but a firm of that name, commonly known as Suffering Moses, still exists in Srinagar. The number of artizans who work in this trade is about 150 and at present articles valued Rs. 5,000 are made annually. At one time goods valued Rs. 10,000 were sold in Kabul and Rs. 7,000 in France and other European countries. The articles in demand in Kabul were pencases (Kalamdams) and spoons (Kashoke). These latter were of five kinds

Sherbat Khori, Mas Khori, Dud Khori, Troosh Khori and Serin Khori. Kalamdans were either Masnadi or Farsi. Shields, bow and arrow with case were also made. Every Pundit, in former times, had a Kalamdan of his own which he carried in his arm-pit wherever he went. These *Kalamdans* were exquisite works of art.

Under the influence of the French shawl agents, other articles were made such as nest boxes, vases, and soorais. Shawls were sent to France in papier mache boxes which were separately sold at high prices.

Lacquered work was also used for the decoration of ceilings, and various other purposes, such as palanquins, howdas &c. The Lamas of Lhasa indented for a kind of table called Saksha on which were placed 2 books (Fekru) and 9 pieces of wood. The table was beautifully worked in Chinese pattern in gold, and red and green medallions.

Papier mache is made from paper softened and laid layer upon layer within a mould, by repeated slow drying and adding. After obtaining the correct shape it is wrapped round with cloth and covered with *guch* in glue. The surface is next smoothed and the *Zamin* or ground colour is applied. This colour may be gold, cochineal, ultra-marine, white lead and verdigris, &c. When dry the pattern is painted in water colours. The art lies here. It is an interesting sight to see old artist, elaborating from memory patterns of difficult artistic designs in rich and subdued colours. When thoroughly set the whole is varnished by Kahruba or Sundras (copal) dissolved in turpentine. The brushes are made of the hair of the shawl-wool goat and the pencils from the hairs in the fur of the cat. The old patterns are—

- | | |
|----------------------------|------------------------------|
| (1). Shawl of 3 varieties. | (8). Gold with black, white |
| (2). Yarkand. | or red. |
| (3). Badakshani. | (9). Rumal. |
| (4). Bokhara. | (10). Mythological figures. |
| (5). Zamrudi (Emerald) | (11). Rose with birds, flow- |
| (6). Chinkar. | ers and foliage. |
| (7). Gold Arabesque. | |

Rupees 500 were formerly collected as tax by the State from papier-mache workmen in Srinagar. No workmen of one firm could be employed by another without permission. Maharaja Ranbir Singh greatly patronised this industry and usually presented papier-mache coffee sets to his European friends.

Papier-mache work has greatly deteriorated of late. The best Kalamdars are seldom made for there is no demand for them. This work is extended to floral decoration and illustrations of books, memorial &c.

The articles usually made now are picture frames, screens, tables, teapoys, trays, vases, glove, handkerchief and stamp boxes, candle sticks and similar articles.

In place of paper, wood is now used, with a very thin coating of pulp. No pains are taken to prepare a proper *Zamin*, and the designs and workmanship are very inferior and often hideous. The quaint shaped Soorais or Vases, the moulding of which is very difficult, are now seldom made. The old designs have given place to modern patterns ill conceived and worse executed. The new designs are Iris, Chenar, Cherry blossom, Tulip, Hyacinth, with a great display of colours but no art in them. The intricate freehand scrolls are no more seen. The colours are bad and the varnish is not properly applied. An old papier-mache article would retain its colour for 50 years or more and was none the worse even if dipped in water for days. It is a great pity that this beautiful art should be sacrificed for the sake of cheapness.

Sir George Watts once told me that he found some papier-mache works with photo-transfers. I made special enquiries and I am glad to say that Kashmir work has not yet come to that. Sir George might have seen them on some Indian imitations.

WOOD-WORK.

All ancient Hindoo buildings of Kashmir are of stone, but the mosques are of wood, and some of them,

such as the Shah Hamdan and Makhdum Sahib of Srinagar, show great dexterity in the carpenter's craft. Some good carving is seen in some houses and boats. The Kashmiri carpenter is a bad joiner but as a designer he excels. The following kinds of work are now done :—

(1) *Pinjra* or lattice work of various patterns constructed on a geometric basis or floral design, very bold and effective. Either Deodar or Walnut wood is used. The work is made of small laths so arranged as to form a pattern and held in position by well fitted pressure exerting one against another ; glue is seldom used. The best kind of *Pinjra* work is known by the Kashmiri names of *Sekhsar Daosda Sar*, *Fahan Sirin*.

(2). *Khatumbandi* or panelling in various geometric designs applied to ceilings. Thin panels of pine wood are made into various geometrical forms and fitted together in grooves. When Lord Lansdowne visited Kashmir I exhibited a collection of large varieties of this work. These cheap and effective ceilings have been sent to India and England. The best kinds of ceiling work are known as *Dak Tej*, *Daosda*, *Girid* and *Hastajul*.

(3). Carving. This commenced with deep carving in floral designs, but the modern patterns are realistic carving in bold relief of Chenar, Iris, water-lilies or radiate bull-rushes, with a great deal of undercutting. The walnut is stained and carved in lotus flowers cut in section botanically, or in the form of Iris, Chenar leaves and branches or bunches of grapes or pears standing half an inch over the surface showing great skill but little art. The latest is a the Lhasa pattern. Some people regret this change from conventional to realistic art. But of these Sir George Watt says, " Perhaps one of the most surprising features of the exhibition may be said to have been the avidity with which every bit of this modern Kashmir work was purchased."

At one time carved wood table with copper or copper enamelled tray centre was a great favourite. But now

wooden screens, tables, picture frames, trays, cigar boxes, fire-screens, music-stools are in demand. Large orders are received from Messes, Clubs and others for chairs with carved crests and monograms, also for large hall chairs.

Wood-work was an ancient art among the Hindoos, for we see mention of it in some of the Purans which give detailed directions for felling trees at particular seasons when the sap is down, and for seasoning the wood afterwards, so as to prevent unequal contraction and cracks in drying.

The Kashmir wood work is falling into disrepute owing to the use of unseasoned wood. The manufacturers are not capitalists and cannot invest their money in wood and wait till it is well seasoned. There is one way out of this difficulty and that is to artificially season wood by steam. The carpenters are very lazy. If you order a screen it takes six months to finish it. This also is checking the progress of this important art industry in Kashmir, and lastly fancy prices are charged.

In the Museum at Srinagar there are samples of the best carved wood-work with their prices per square foot, calculated by employing the best workmen to make them. To this, of course, should be added a commission for supervision, if orders are sent through agencies. Another draw-back is that articles are not well finished. On the back of a well worked table, perhaps a board from an old wine case will be found.

Dealing with the present day Kashmiris one notices how, with the arts and the trade which Kashmir had in olden days, the business like and commercial qualities of the people have also deteriorated. A shawl trade of 30 laks of rupees could not have been carried on with foreign countries, if the men were not industrious, honest and business like, but now in every department of art industry the workmen, as well as the employers, are not quite straight in their dealings both as regards the prices and the nature of articles produced. In spite of poverty there

is laziness. An article which could be easily made in a fortnight will not be finished for months. Instructions carefully given will be ignored. There is no enterprise and there is a great natural distrust among trades people. An exhibition of arts in Kashmir is almost an impossibility for the traders jealously guard their designs and patterns and would not expose them to the view of other traders lest they are copied. It is amusing to see how a trader will suddenly drop a sheet of cloth over his wares if another trader happens to arrive when he is showing them to a customer. Even most respectable dealers will run down their brethren of the same trade and apprise another man's goods at low rates. For these reasons agents who buy for other people find it very difficult to deal with Kashmiri traders and the trade suffers immensely. An Act for the registration of patents and designs is now a great necessity. The old Dagshawl exercised great control over designs. It is indeed hard if the result of a man's fruitful brain is robbed by another without his permission.

METAL WORK.

Kashmir has ever maintained a high reputation for the excellence of its Metal work. Speaking of the parcel gilt silver work of Kashmir, Sir George Birdwood says "their elegant shapes and delicate tracery, graven through the gilding to the dead white silver below, which softens the lustre of the gold to a pearly radiance, gives a most charming effect to this refined and graceful work. It is an art said to have been imported by the Moguls, but influenced by the natural superiority of the people of the Cashmere Valley over all other Orientals in elaborating decorative details of good design, whether in metal work, hammered and cut, or enamelling or weaving."

The metal work in Kashmir may be classed as below :—

(1) *Tinned Metal*.—It is a Turkoman art introduced into Kashmir where it attained great perfection. Tin is

soldered on copper previously graven with floral design, the sunken ground of which is then filled with a blackened composition of *lac*. The best patterns are rosette on a black ground and the Arabesque style. The raised patterns shine like frosted silver out of a ground work of blackened foliated snow delicately traced. It partly resembles Muradabad work, but is infinitely superior in art and design.

(2) *Lac work on brass and copper*.—This work is not very effective and only a few specimens can be seen.

(3) *Enamelling*.—This is done on brass, copper and silver by fusing over it various mineral substances. The metal is repoussed and the colours are imbedded in the depressions, or the surface is painted with the fusible paint and then heat is applied. The enamels are imported from India. The colours are silicates or borates, yellow through chromate of potash, violet through carbonate of manganese, blue through cobalt oxide, green through copper oxide and brown through red iron oxide. Beautiful pale blue is produced by mixture. Enamelling is done in various patterns—Shawl, Arabesque, rosette, chinar, Mosaic, *Banderoom*, *Islim*. Silver and black enamel called *Saunt Kar* is a very pretty work, not generally known, but deserves much appreciation.

There is evidence that Niello enamelling is known to Kashmir craftsmen as some excellent articles with Niello ornamentation can sometimes be obtained.

(4) *Copper and Silver work*.—Copper was once a great favourite, but is now going down partly because the patterns are not so good and the metal tarnishes quickly. Copper articles sent to England reach there quite black and when cleaned by mineral acids the polish is lost. In Kashmir they are cleaned by vegetable juices.

The best silver work was of the old shawl patterns copied from shawl work. This required much time and labour. All the various shawl designs were copied in metal work, such as Arabesque, Rosette, Chinar, Mosaic,

Banderoom, Islim, &c. The great designer in silver work was a man named Rahat Sut, who lived in the middle of the last century.

Silver and copper with gold gilt are also made in various designs.

During recent years the old style of engraving has been replaced by 'repousse' work in Chinar, Iris, Thistle, Bulrush and Rose patterns. The old Kashmiri patterns are—Lhasa bowls, Yarkand Vase, Bokhara Vase, Kashgar, Lotus, Aftaba, Kangri, all very unique and truly oriental. It is a great pity that some visitors, ignoring true art, give a catalogue of a European jeweller's firm to the Kashmir silversmith and ask him to copy the Queen Anne, the Windsor or the Georgian pattern tea set. This mixture of the oriental art and the occidental pattern is most unhappy. If you want a tea set, why not have the Yarkandi teapot or a Lhasa bowl for a sugar basin worked in a delicate shawl pattern instead of an English pattern teapot.

(5) The work known as *Bidri* work from Bidar in Deccan, is also done in Kashmir. The designs are worked in wire imbedded below the surface.

Most of the vases and jugs made in Kashmir bear the impress of Mahamedan patterns, being provided with a spout, because the Koran ordains that a man shall perform his ablutions in running water which is imitated by water running from the spout. From the time of Sikhs, however, Hindu forms such as the *Lotus*, the beggar bowl, the *Tasti*, etc., were introduced. I think it is a mistake to connect the word "*Lota*" with "*Lotus*," however much the shape of an Indian *Lota* may resemble a water-lily.

A large trade is done in old brass and copper in imitation of Ladakh, Thibetan and Yarkand patterns and sold as such. These articles are made in the bazaars of Srinagar and are buried in the earth and otherwise dealt with to give them an appearance of antiquity, which the unwary purchaser buys as old Ladakh and Yarkand goods.

Very unique and quaint patterns of candle-sticks, lamps, vases, teapots &c. are however seen.

The carved wood table with a copper or enamelled tray centre is a fine combination of the carpenters' and silversmiths' arts. I had the privilege of making perhaps the first tables of this kind. Thousands of these were sold and they were for a long time in great demand, but the carved wood work having recently much improved, tables made entirely of wood are now in favour.

(6) Swords with damascened hilts or blades were formerly manufactured largely. Maharajah Ranjit Singh's army, as well as that of the Jammu Raj, used swords manufactured in Kashmir. Gold on steel is called *Munbut Kar*.

The gun-smiths of Srinagar are exceptionally skilful workmen. They can replace parts of any machinery, equal to the original, and can make excellent spears, daggers, matchlocks, guns and rifles. Sterilizers, aseptic furniture and many of the surgical instruments in use in the hospitals are made by them. One man has made a Japanese loom, as good, if not better than the original. If supplied with better machinery and good steel, these clever blacksmiths would produce articles of the highest perfection.

Maharajah Ranbir Singh maintained a *Mistri Khana* or work-shop, which manufactured all Military accoutrements.

The demand for silver work is, however, fast going down, due chiefly to the alloy which the Silversmiths of Srinagar use in their work, as much as half silver and half copper being sometimes used. The shiny and well chased articles become therefore black and dull after a year or so. White metal is now imported largely and is used in place of silver. Kashmiris formerly had no idea of electroplating or electrogilding, but now every silversmith possesses an electroplating apparatus which he uses largely on white metal.

STONE WORK.

The ruins of Martund testify to the ancient stone carving of Kashmir. Even in Mogul times the art was not lost as shown by the carvings in the pavillion and water-falls of the Shalimar gardens. One of these carvings has given the Banderoom pattern worked on wood and metals. The modern stone work in Kashmir is lapidary work, such as engraving seals. Jade is imported from Yarkand and is cut for seals and pendants. The Jade sceptre obtained as a trophy of the subjection of Leh, now in the Srinagar Museum, is a master-piece of the lapidary's art and is priceless in value. Cornelian, Blood stone, Onyx, Liver stone, Moss stone, Lapis Lazeli, Rock-Crystal, &c., are also imported in small quantities through Ladakh and are made into buttons, beads, brooches etc. But the articles now usually sold in Srinagar are either made at Delhi or made with stones, and coloured glasses imported from Europe. Snuff boxes and stamp boxes are made with coloured glasses and the shining buckles often sold as rock-crystal buckle are made with "paste diamonds" sold at Delhi at 6 pies each. A large quantity of Delhi jewellery, such as rings, brooches, &c., made with four carat gold and artificial coloured stones, is imported and they are sold as genuine Kashmir made articles and greedily bought by visitors.

True turquoise can be had at Ladakh, but false turquoise is largely used in Srinagar for making articles in brass, copper and silver with small chips of false turquoise compacted by a cement. These articles were until recently a great favourite, but are now rejected as they deserve to be. False turquoise is glass coloured, or sometimes a poorly coloured stone is coloured to give it a deeper shade. The artificial colour becomes lighter if the stone is rubbed between the fingers with a little oil or butter.

The lapidaries of Srinagar are however very clever, and the *Tograi* monograms which they engrave on various kinds of stone are excellently executed,

Mirza Mohamed Haidar, who practically ruled in Kashmir in 1540 and who is said to have introduced tea into Kashmir, writes in *Tarikh-i-Rushidi*. "In Kashmir one meets with all those arts and crafts which are in most cities uncommon, such as Stone-polishing, Stone-cutting, bottle-making, window-cutting (*taldan-turash*), gold beating, etc. In the whole of Mavara-un-Nahr, except in Samarkand and Bukhara, these are nowhere to be met with while in Kashmir, they are even abundant. This is all due to Sultan Zain-ul-Abidin." In *Tarikh-i-Rushidi* there is no mention of Shawls, but Silk is mentioned—"Among the wonders of Kashmir are the quantities of mulberry trees cultivated for their leaves from which silk is obtained."

SERICULTURE.

Sericulture is an ancient industry in Kashmir. Kashmir silk found its way to Damascus and Bokhara and the Issidones; the inhabitants of modern Khotan, were the chief agents in the transmission of silk into Western Asia and Europe. Nothing is known of the industry after the Pathan rule till Maharajah Ranbir Singh revived it in 1869. Disease chiefly Pebrine and Flacherie proved ruinous to Sericulture. The present Sericulture is done on the principle of annually importing seeds from Europe and distributing them among the villagers, who rear silk-worm and sell the Cocoons to the State at a fixed rate. The reeling is done in State filatures in machines manufactured in Europe, and the silk produced is sold in Europe.

In 1898 there were 17,433 Cocoon rearers, 11,36,880 maunds of Cocoon were reared, and 1,65,468 maunds of silk were reeled. About 5,000 hands are employed daily in the State filatures. Speaking of the Kashmiri reelers Sir Thomas Wardle says—"I feel sure that were it not from the minute delicacy of touch and their skilful fingers, these men and boys would not have become so proficient in as many years as it has taken many

of them months to learn to reel." Experiment is being made in Silk-weaving under a European weaver in looms imported from England. 212 hand-loom are now set up. There is however no reason why excellent silk, plain and of various designs, cannot be woven by Kashmiri weavers in Kashmiri looms, nay, I believe an excellent fabric of the nature of brocade and *Himrus* could be woven Shawl fashion. I have already met with some success in experimenting in this direction.

Silk can be dyed in Srinagar with vegetable dyes, in all the shades of shawl colourings, with *Datiscus Canabinus* (waft tauj), *Delphinium Sp.*, *Rubra Cordifolia*, *Geranicum Nepalense*, (*Mazait*), *Mallotus philippinensis*, &c.

The arts of Kashmir should be conserved in their true Kashmir style, and they should not be corrupted by modernising or hybridising them under the influence of foreign ideas. But there is no doubt, much improvement will follow if the present artisans are taught the first principles of drawing and other subjects which underlie all art industries.

There is a vast field for industrial development in Kashmir, and this is now much easier owing to the great electric scheme completed by H. H. Maharajah Sahib. Power is obtainable at the comparatively cheap rate of £ 8 per Horse power. The following may be mentioned as some of the branches of industry which may be introduced or improved in Kashmir. There is the opening for establishing manufacture and factories, machine for husking rice, for grinding oil from oil seeds for sawing timber, and for mortar and flour mills. The following are some of the possible industries capable of development:—

(1) Wicker work. The country is full of willows and the modern basket work is crude. Instructions, by expert craftsmen from Europe, may be given to produce wicker work of European standard. Willow wood is taken down from Kashmir for making cricket bats, rackets, etc. They could be made here.

(2) 27,000 maunds of linseed are exported from Kashmir annually. This gives an idea of the linseed flax available. Linen can be manufactured under supervision of an expert Irish linen manufacturer.

(3) The value of export of hide and skins last year amounted to Rs. 2,29,720 Tannery under modern methods and leather factories to make shoes, saddlery and various other leather goods of modern use. That the Kashmiris know the art is seen from the excellent *yakduns*, *chaplis*, etc., they make.

(4) Cabinet making of the best type could be taught and would be of great profit in this country of walnuts and deodars.

(5) Dyeing, under improved methods, would be easy in a country where excellent vegetable dyes are available. Why should silk be exported, for the purpose of being dyed, from a country where the colouring of the shawls is still the admiration of the world? On the other hand it is but natural to hope that textile fabrics, from all parts of India, will be sent to Kashmir to receive the permanent and soft colours which only Himalayan vegetable dyes can give.

(6) A very crude kind of soap is now manufactured from the alkaline ashes of the pine, the elm and the amaranties with mutton fat and *Mah*. For washing shawls and wools the roots of *Aster Diplostephiodis* (*Salner*), *Dioscorea deltoidea* (*Krits*) and of the red beans of the lobia are used. Raw materials, necessary for good washing, and toilet soap are available.

(7) Perfumeries could be manufactured from roses and various other fragrant flowers. In the time of the Moguls the roses yielded a revenue of 50,000 rupees. *Pedicularis brevifolia* (*Kasturi*) or *Delphinium Kashmiranum* will yield an excellent perfume. Tooth powder could be prepared from the *Orris* root which is available in abundance. Similarly the powdered roots of a plant called *Zonir*, is really a stimulant and preserver of hair.

(8) Match factories should be remunerative in a country of pines, which may be also utilized for extraction of pine oil, turpentine and perhaps for the manufacture of a textile fabric, as good as flannel, which is made from *Pinus Excelsis* in some countries.

(9) China clay (Kaolin) is available, also the finest kind of pottery clay.

(10) Down could be collected from ducks, eider, king ducks and the wild swan.

(11) There is wild olive all the way from Domel to Uri. Extracting oil will be a remunerative pursuit.

(12) A fortune awaits the enterprising man who will build well regulated bathing establishments at the sulphurous and other medicinal springs of Kashmir, for it would be easier for people in India, with constitution shattered by Malaria, to go through a course of balneopathy in a place so much nearer to them than the springs of Europe.

(13) Many medicinal plants grow wild and can be cultivated, and excellent opportunities exist for the manufacture of pharmaceutical products. The following grow in abundance.—*Cannabis Indica*, Absinthe, Aconite, Hyoscyamus, Pichorhiza Kurrooa, Podophyllum, Colchicum, Belladonna, Pyrethrum, etc. The best insect powder, I know of, is the powdered root of *Kut* (*Saussurea Lappa*), which is much better than Naphthaline, as a preserver of wool, fur, feathers, &c.

(14) Apiculture will be a profitable business, for the honey of Kashmir is much prized in India.

(15) *Paper-making from wood pulp*. Suitable wood is found in abundance such as the Silver Fir and *Daphne Papyracia*. The hand-made paper of Kashmir was once not only solely used in Kashmir but was largely exported. It is a durable well glazed paper made from rags or rags with hemp fibre but in price cannot compete with the cheap mill-made paper of India which has nearly taken its place in all official use.

(16) The cultivation of Sugar Beet will be a remunerative industry.

(17) Cheese-making and Casein manufacture will be a remunerative industry in this country with rich pasture land.

A new era of industrial development is dawning in Kashmir. The Jhelum river has been harnessed and Electric power of 20,000 horse power is insured, which will no doubt be utilized in manufactories. The day is not distant when Kashmir will be a great industrial centre.

POTTERY, TILES MANUFACTURING, GLASS- MAKING AND ENAMELLING.

BY L. KANAYA LAL, ESQ.,

Drawing Master, Lahore.

(Written in Urdu and translated into English by Mr. Narain Das, B.A., C.E., Editor, Indian Businessman, Amritsar).

It is now 25 years since I first came to the Punjab but this is the only occasion when I was fortunate enough in having been accorded an opportunity of writing something on the above subject. This is all due to our Chairman the Hon'ble Mr. Harkishen Lal, who, armed with the sympathy and good wishes, of the Hon'ble Sir L. W. Dane, Lieut.-Governor, Punjab, in the cause of industrial regeneration had offered me a chance of writing on subjects of industrial importance calculated to interest our countrymen.

Tiles and Pottery, Glass-making and Enamelling.—These form a set of three very useful industries, closely related and dependent on each other. Glazing and enamelling are essential in pottery works.

Tiles making and Pottery. There is plenty of suitable clay, white or coloured to be found in the different parts of India. This is first cleaned of all foreign matter, ground into a fine powder with white silica and kneaded up with

water to the proper consistency. This done, the mass is now ready for manufacturing purposes and is moulded into various shapes and designs which are, then, allowed to dry. These are then baked in Bhattees or kilns, into strong and durable articles of commerce and are more or less stone-like in appearance. Tiles and Pottery of varying shades of colours and of manifold designs can then be manufactured. Pottery utensils come into use when sour or acid things are to be kept for some time. Excellent tiles can be prepared, in this country, that would compare in neatness of execution and beauty of design with the superior specimens imported from Europe.

When once Pottery or Tiles receive a thin coating of glass or enamelling, they become proof against the rigours of the climate, and last for great lengths of time. For this purpose the Tiles or Pottery have again to be put into a kiln or Bhatti, where the articles are subjected to further strong heat until thoroughly covered with a glaze or enamel. Glazed Tiles or Pottery is by no means rare in this country.

Glass-making. Plainly speaking, glass is nothing more than white silica, soda and lime melted together under strong heat in bhattis or kilns specially prepared for this purpose. When coloured glass is required, oxides of lead, iron, tin, zinc, copper, silver, gold, cobalt, manganese etc. are also added on to suit the requisite shade of colour. The oxide of tin produces white coloured glass, lead oxide gives it a yellow colour, cobalt produces a magnificent blue and gold a fine red tint. Silver oxides lend orange colour to glass but those of iron beat the rest in producing red, yellow and green colours according to the temperature to which the mixture is subjected in the oven. All these metals, the oxides of which are so useful in glass-making, are found in India. The white or coloured glass thus prepared can be placed in the market in the shape of lamps, chandeliers, tumblers, bangles, door-handles, bottles and other articles of fashion and use. It is with this very stuff that tiles and pottery are glazed in the manner described

above. Then, again, the enamel coating that we find on iron plates etc., and china utensils consists of nothing more than the white or coloured glass stuff above mentioned which may thus be safely pronounced to form the basis of these industries.

Enamelling. Enamel is a glass-paint. The durability that it lends to tiles, etc. is apparent from the old specimens of architecture of the Moghul period which we find intact even to this day, showing not the least trace of decay. At Lahore a visit to the tomb of Jehangir and the Shalamar gardens will amply illustrate my meaning. This useful art has unfortunately, in these days fallen from the high pedestal on which it stood in days gone by. Other countries have made much progress, however, while we have been asleep. This art is founded on the glass-making industry I have dealt with above. Earthenware, iron utensils, china ware, and tiles are the principal articles coated with enamel. Enamelled articles retain their original lustre for hundreds of years even under water. I would strongly advise my countrymen to devote their attention to this important art. We have all the needed materials in abundance in this country. The supply of Silica is inexhaustible in India. I notice with extreme regret that till now we have succeeded in establishing only two or three glass works in the whole of India. Some of them have existed for the last five or six years but the glass manufactured by them does not yet come up to the quality of the European commodity with which it has to, or ought to, compete.

The other day I had a talk on the subject with a friend of mine who owns a glass factory. "How was it," I enquired, "that your factory is still turning out only coloured glass fit for bangles without going further and producing superior work? Why not manufacture sheet glass for window panes which is so largely imported into India from abroad every year?" My friend replied that

for such work he will have to depend on foreign workmen and machinery. How far that answer can be said to be satisfactory, I leave it to my readers to judge.

As for myself, I know but little English, nor am I a rich man. I have never as yet received any kind of help from any factory or workshop nor have I ever gone out of India. I have derived help and instruction only from old books on Engineering and Chemistry. I have never been lucky enough to possess even a small glass furnace of my own, which fact would explain my inability to place in the Lahore Exhibition, as promised, the tiles prepared and enamelled by me. The articles that are now ready under my supervision are in no way inferior to foreign ones, and I hope to be able to show specimens of my workmanship in the next year's exhibition.

Had my friend to whom I suggested manufacture of window frame-glass received complete training in science of chemistry as applied to glass making, I should never have received the answer from him that I did. The real thing is this. Those who get a good English education, do so for the sake of livelihood, that they may secure some clerical post. Science, arts and industries never claim their attention. People have not yet seriously taken to the study of physical science which is only taught in colleges to advanced students, who have seldom the inclination to devote themselves to the practical side of it and to gird up their loins to work earnestly and hard in that direction for the good of the country. Some of those whose knowledge does not extend beyond the vernaculars may be sincerely anxious to devote themselves life and soul to such pursuits but there is not a single newspaper or magazine, school, society, library or college to which such people might look for instruction. It is not every body that has the means to avail himself of the luxury of an expensive college education. High Schools and Colleges imparting instruction through a foreign tongue have achieved their object in so far as to flood the land with

educated Government servants who can thus be had comparatively cheap, the supply having far exceeded the demand. It is not now to service but to business and industry that we must look to solve our present difficulties when poverty is stalking over the land. It now behoves our countrymen to hasten to devote their early and earnest attention towards practical arts and industries. Let the owners of factories and workshops impart only such education to their sons that may be of some practical benefit to them in such work and which may enable them to infuse new life into our decaying old industries. It is a pity that we Indians devote little or no attention to arts and industries. While foreigners are making their millions out of their knowledge of the practical sciences, how sad it is to reflect that none of us has the strength or brains enough to even translate European scientific works in vernaculars. Our countrymen have not the courage to persevere.

Just look to our Medical and Engineering Colleges. The moment our students turn out of these technical institutions they get service. But how long will it, can it, continue? Only so long as the needs of the Government are not satisfied. The moment the supply of such qualified men begins to exceed the demand what will happen? What shall the Engineers do? They will find those artisans better off who know how to work with their own hands and to apply their practical knowledge of arts and industries to some material use.

Enamelling is a very important industry and is one of the first that should be tackled by us now. This is an art to which I have devoted a valuable portion of my life and have succeeded in solving its problems without the aid of any European workman or factory. I am now ready to offer the benefits of my knowledge and experience to my countrymen. I, therefore, propose that an Industrial School be opened at Lahore to impart practical and theoretical instruction in the vernaculars. For a school

like this no less than five lacs of rupees shall be needed. The school could be conveniently maintained on the interest earned on an endowment of 4 lacs of rupees. Another Rs. 75,000 shall be needed for an enamelling workshop connected with the school. The other 25,000 will suffice for the buildings requisite. The enamel works will be able to do all the work that has been described under 'Enamelling' above, and produce goods equal to those imported from abroad with the additional advantage of being cheaper.

The factory will probably be the first of its kind in India. The names of those patriotic gentlemen who can see their way to financially help the cause will be engraved in enamel on the foundation stone of the buildings to carry their names to the generations yet unborn. Raw material is exported from here to other countries and returns to us in the shape of finished goods. Why can't we utilise these raw materials here ourselves without exporting it in one form and importing it in another?

And now, before I conclude, let me tell you a short story to illustrate how others devote themselves to the task in order to master the details of an art or industry. Sometime ago, it is said an English company sent a man to Japan to learn the secret of manufacturing steel. The man could not manage to get into the factory and had to live in Japan as a beggar for sometime. Gradually, by dint of perseverance he obtained some menial service in that factory and at last through hard and honest work rose to posts of trust under his masters who began to repose confidence in him. The original reserve began to melt away and the man at last succeeded in getting initiated into the mysteries of the art, after which he took leave and returned to England. It appeared, however, that his knowledge and experience in the line being raw he could not make much headway in England. Accordingly he had to be sent back to Japan which meant considerable additional trouble and expense. He again got in and had to

remain, another length of time before he returned home, this time a complete master of his art. He was honourably received by his countrymen and earned millions of pounds by utilizing his practical knowledge, so dearly brought. All this was due to his perseverance and to the sympathy and support of his countrymen.

I trust my countrymen will take this example to heart and do likewise. Our land is full of resources ; we have only to exploit them.

BRINJAL CULTIVATION IN 24 PARGANAS

BY A. P. GHOSH ESQ.,

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Introduction :—Brinjal being the most favourite vegetable is widely cultivated in the district of 24 Parganas. It is indigenous to the district. It is a remunerative crop occupying as it does, a position next to that of potato.

Names:—English name—Brinjal.

Botanical Name—*Solanum Melongena*.

Bengali Name—Bigun.

Hindusthani name—Baigan.

Sanskrit name—Bârtâku.

Varieties—There are two varieties :—(A) ordinary variety to which belong Muktakeshi, Elokeshi and Mâkrâ; (B) Kuli Begun. The ordinary variety being highly profitable is the subject of this paper.

Soil—Sandy loam soil that is high, free from water-logging and rich in organic matter is highly favourable to the crop.

Manures—Brinjal is often cultivated with manure. Cowdung and tank-silt are the only manures that are considered the best.

Plantation—The soil for brinjal cultivation should be subjected to thorough weathering. For this purpose, early

in January the field should have two deep ploughings with two deep cross-ploughings. By the end of April the soil should be properly levelled and pulverized and tank silt with well-rotted cowdung should be scattered all over the field. Early in the beginning of May, after a moderate shower, seedlings are planted in rows two cubits apart. In twenty days one hand-weeding is given and then with the *kodali*, ridges are made along the rows. In next twenty days water channels are made all round the field and ridges are made sloping towards the channels. The earth dug up in making the channels is utilized in raising the ridges. Being very susceptible to fungoid diseases, brinjal plants should be guarded against stagnant water ; that is why water channels are made running through the plantation. One earthing by the end of July and one monthly hand-weeding in each of the successive months of August, September and October are essential. Fruiting goes on from the end of June to the end of October, when the soil becomes dry. Henceforth, irrigation, that is to say running of water along the channels between the rows, once a month from November to January is necessary to keep up the crop to the end of March following. The first irrigation should be followed by splitting the ridges, as taking of the soil causes early decay of the plants. Brinjal crop being ever ready to invite the attack of insect-pests, cannot be grown more than once in three successive years in the same field. When a plant is attacked, it should at once be uprooted and removed from the garden and a good quantity of ashes should be sprinkled at the spot where the plant grew.

Preparation of seeds.—A number of pretty big fruits should be allowed to ripe. When turned into perfect yellow, they should be plucked and kept in a dry spot for a week or so, after which they are severed right through the middle and seeds are easily separated and

fairly washed in water and exposed to the sun. When dried they are collected in a bottle.

Preparation of seedlings.—Early in April the sowing of seeds is made in a shady well-manured spot, the soil of which should be fairly pulverized. When ready for sowing, a light watering should be given to the soil and seeds should be evenly sprinkled and the hand delicately moved over the surface to give the seeds a thin coating. The seeds usually germinate in 5 days, but watering in every evening should be continued for a month, after which the seedlings become ready for transplantation.

	RS.	A.	P.
Cost per bigha, two ploughings and two cross-ploughings	1	8	0
Manuring with tank silt and cowdung	5	0	0
Harrowing in April	1	0	0
Preparation of seedlings	1	0	0
Transplanting seedlings	1	0	0
Hand-weeding and making ridges	1	8	0
Earthing and making water-channels in June... ..	1	8	0
Earthing in July	1	8	0
3 Hand-weedings in August, September and October	3	0	0
3 Irrigations followed by hoeing	6	0	0
Harvesting	3	0	0
Rent	4	0	0
Total	30	0	0

Out-Turn.—The average number of fruits given by a plant may be put down at 20. So, a plantation of one bigha containing 1,600 plants will yield as many as 32,000 fruits, the average price of 40 pairs of fruits in any bazaar in the district being 10 As. the out-turn comes to Rs. 250. Hence the net profit per bigha is Rs. 250-30 that is to say Rs. 220.

HIGH PRICES OF FOOD STUFFS IN INDIA

BY SEEDICK R. SAYANI, ESQ.,

Bombay.

The Industrial Conference has perhaps no direct connection with this all important subject, which is now engaging the earnest attention of many thoughtful minds in India. It is closely connected, however, with the trades and industries of India in certain respects. The trade of any country is affected by the wages prevailing therein, and these chiefly depend on the prices of the necessities of life. Thus, high prices of food stuffs, &c., cause wages to rise abnormally and thereby dislocate and paralyse the commercial activities of a country. It is our duty, therefore, as members of this Industrial Conference, to inquire into the causes of the prevailing high prices and if possible, to suggest remedies. In the first place, I must frankly admit that I do not claim to put forth any infallible remedies but rather to invite discussion on it. This will enable some of you, who are much better qualified by their experience and expert knowledge, to express their views and guide us in coming to a decision. It must be remembered that prices in a country must not be considered absolutely but in comparison with the prevailing wages, rent &c., in the country. Putting it the other way, we must know the purchasing power of money in that country, when we are considering the income per head of the population. It is stated, for instance, that in the early part of the 19th century the cost (yearly) of the necessities of life was about Rs. 10/- per head. Suppose for the sake of argument that it is Rs. 20/- per head in these days. If we know that the income per head was Rs. 10/- in those days, and is Rs. 20/- at the present time, we may safely come to the conclusion that prices and wages have risen since then. In order, therefore, to make this subject most clear we shall give a few more statistics.

It appears at first from figures given in the *Ain-i-Akbari* that prices of the necessities of life were very low in the 16th century in India. It does not follow, however, that the cost of living was equally low, because the prevailing wages

were also low, almost in the same proportion. For instance Abul Fazl gives the following prices of some of the articles:—

Wheat per maund	12 dams	4 as. 9 ps.
Barley	8 "	3 as. 3 ps.
Ghee	105 "	Rs. 2 10 as.
Milk	25 "	10 as.

Similarly the following figures represent some of the wages prevailing at that period. It should be noted that the rupee in Akbar's time was divided into 38 or 40 dams:—

Masons	5 dams	2 as.
Bricklayers	3 "	1 a. 3 ps.
Water carriers	2 "	10 ps.

In order properly to appreciate these figures, we must bear in mind the fact that value and price though often used to express the same set of ideas are really distinct terms. The value of any commodity consists of two things, *viz* : its utility and the difficulty of obtaining it. Water for instance, is a thing of great utility, but still it has got no value in places where it can be obtained without any difficulty. In large towns, it has got value because the element of difficulty in obtaining it, is present ; on the contrary, if a thing is simply rare, but has got no utility it will not possess any value. The price of an article is its value expressed in terms of money. Value is not an absolute but a relative term. For instance, if butter is obtainable at 8 annas per seer and milk at 2 annas. per seer, it means that the value of the former is four times that of the latter. Hence the money acts as the measure of value. But the function of money is also to act as a standard of value. Hence it is necessary that it should have stability of value. For instance supposing a man borrows, Rs. 1,000 to be paid, say, after six months, and if the value of the rupee doubles by that time, in effect he will have to pay double the amount he borrowed. Hence stability of value is one of the essential attributes of money, but hitherto it has not been found possible to keep money, whether gold or silver, perfectly stable in value, but we have to remain satisfied with a material which though not perfect, best meets our requirements. We shall find

later on, that it is the lowering of the value of the money (silver in this case) which has been one of the causes of the phenomenal rise of prices in India.

Economists have shown that a rise in the general level of prices may be brought about by two different sets of causes. It may be that, obeying the universal laws of supply and demand, gold or silver may become cheaper through an unusually large supply of the precious metals on account of the opening up of new productive mines. On the other hand, if there is a general cheapening in the methods of production, owing to the invention and use of labour-saving appliances, prices will tend to go down, unless counteracted by other causes. But as money is itself the measure of value, its value, if lowered, is at once reflected in a general rise in the prices of other commodities and *vice versa*.

In India, prices have been affected by numerous causes of which the following may be regarded as some of the most important; *viz*: (1) Foreign competition, (2) Growth of population, (3) Importations of the precious metals, especially silver, (4) Opening up of the country through railways, telegraphs &c., (5) The building up of real credit and lastly, (6) Fall in the price of silver compared with that of gold. All these causes have influenced, more or less, the purchasing power of the rupee (or money) in India or in other words, has raised the prices generally. But we should particularly note that one important cause of the increase in the price of food-stuffs in India, with which we are specially concerned at present, is the substitution of other crops in many places, where food crops were grown formerly. While considering the effects of foreign competition on the general level of the prices of a country, the following facts should be borne in mind:—First, that while the production of manufactured goods in a country, is not limited to any fixed quantity, that of raw material is. It is true that even manufactured goods are made from raw materials, but generally speaking, the price of the raw material employed is so small, compared with that of the finished article that for our present purposes it can very

well be neglected. The production of raw materials, on the other hand, is limited by several considerations. In the first place, in order to increase the quantity of raw material produced in a country (*e.g.* food crops) less productive lands have to be cultivated, which require more labour and expense, and at the same time are comparatively less remunerative. There is a physical limit even to this process, because in any event, the area of the productive land cannot possibly be increased beyond a certain limit, however great may be the demand for agricultural produce. This tends to raise the price of the produce. (2) The growth of population. In India the output of food products has probably not kept pace with the growth of population. Besides this in many places other commercial crops have been substituted where food crops used to grow before. Thus the demand for them is increasing, while the supply is more or less stationary. The following figures will perhaps make this more clear :—Value of the total estimated out-turn of the principal crops in 1908-09, *viz* :—

Cotton about	Rs.	34,27,50,000
Jute „	„	16,77,09,000
Wheat about	„	62,35, 84,000
Rice „	„	2,67,22,33,000
Linseed „	„	2,34, 71,000
Rape and Mustard „	„	10,58, 17,000
Sesamum „	„	10,58, 17,000
Ground-nut	„	6,70,07,000
Tea „	„	9,02, 29,000
Total production is about Rs. 4,20,24,000,000.		

It should be noted that the production of jute in 1907-1908 was worth over 36 crores of rupees.

It would appear from the above figures that—commercial products like cotton, jute, &c., form a large portion of the total agricultural output in India.

(3) The third cause, *viz.*, the excessive importation of precious metals, specially silver, is also important. Asia, and specially India, has long been regarded “as the great reservoir and sink of the precious metals.” The enormous quantity of silver absorbed by India every year has probably

been the chief cause that has kept up the price of silver to its present level, low as it is. But the purchasing power of silver in this country as a consequence of the enormous and continued increase in the stock of the metal held by it, has fallen considerably. In other words, the general level of prices has risen proportionately. Fourthly, the fact that under the ægis of the British Rule, the country is being opened up steadily, has also to a certain extent assisted in bringing about this result. The prices of commodities depend to a certain extent on their proximity to a market. If there is little intercommunication, the produce has to rely on the nearest market within its reach. But with increased facilities of transport, goods can easily be sent to the place, where they command the best price. This tends to raise the prices all-round, because the producers are unwilling to part with their goods, unless the best price obtainable is paid to them.

We have stated above, that the prices of commodities depend inversely on the money in circulation, that is, if the amount in circulation is increased, its purchasing power is decreased and prices risen. But we have hitherto regarded money as being constituted of gold and silver only. But there are other forms of money which are equally powerful in creating a demand for commodities and hence raising their price; for instance, the paper currency, bills of exchange &c. Hence we come to the fifth cause, *viz.*, the gradual creation of real credit in India. "Every creation of credit increases the quantity of money which may be put into circulation, and so has an effect on prices. The creation of credit increases the effective power of demanding goods, and this is equivalent to an increase in the quantity of money." How far credit affects the amount of money in circulation would be clear from the following figures. Some years back, a computation was made of the various amounts of money received from customers by the various London and county banks and the results were as follows.—

In London, coin about 1 per cent.

Notes " 2½ "

Cheques and Bills about 96½ per cent.

In England and Wales :—

Coin	about	15	per cent.
Notes	"	12	"
Cheques & Bills	"	73	"

In a country in a low state of civilization, where little credit is given and large banks do not exist, where coins instead of passing rapidly from hand to hand, are hoarded, a greater amount of metallic currency is required to perform the duties of the circulating medium than otherwise. Besides this, in a country like India where life moves slowly and where the distance between the various centres of trade, is very great, the precious metals are more in demand and hence their purchasing power is greater, and this was actually the case a hundred years ago. But as the conditions of trade in India are gradually more and more approximating to those that obtain in England, the demand (comparative) for metallic currency is decreasing. Hence, we may put down the lowering of the purchasing power of precious metals in India as partly due to the above cause. The last cause, though not the least is the depreciation of the gold price of silver. In the 17th and 18th centuries the price of silver was about 5s. 2d. per ounce. In the last quarter of the 19th century, it began to drop steadily, until it has fallen to about 2s. 2 or 3d. an ounce. This fall in the price of silver has not altered the nominal value of the rupee but its effective value *i.e.*, purchasing power, has proportionately decreased. India possesses a large import and export trade and in international transactions currency goes by real and not nominal value. The relative prices of a sovereign and a rupee are fixed as 15: 1. But the prices charged (and paid also) for commodities worth £ 1 are not Rs. 15, but somewhat higher. In this way also, the general level of prices has risen higher.

The question now arises is such a rise in prices beneficial or otherwise? It may be said generally that producers and manufacturers are, as a rule, benefitted thereby. But as wages also ultimately rise through the same cause, their advantage is only temporary, while the disadvantage to the consumers is perhaps permanent. We shall try to see, therefore, whether the causes, which have brought

about this rise in the general level of prices are removeable.

(1) Foreign competition ; this can be removed by means of protective duties. The imposition of a heavy protective export duty on food products will no doubt prevent their exports in any large quantities. This will bring about a lowering in the prices of food stuffs in the country. But this will ultimately harm those very classes for whose benefit it is meant, viz., the poorer classes of agriculturists. For (1) the export trade in food products consists of only a small proportion of the total out-put, perhaps six or seven per cent. It tends to cause a surplus production during normal years. During periods of scarcity this surplus is attracted towards the affected areas on account of the high prices prevailing there. It thus acts as an insurance against famine. (2) It will cause an economic loss to the country. (3) India is and is likely to remain always an agricultural country. That is, manufacturing industries ought not to be, and need not be, introduced at *the cost of* the agricultural industries, but *side by side* with them. This is quite possible, if improved methods of agriculture are adopted. Besides this, scientific agriculture also holds out enormous possibilities for India. It is, therefore, not advisable to discourage the export trade in raw materials. It is also a well known fact, that when a trade in any commodity is once lost, it is very difficult to regain it. Fourthly, it will cause the substitution of other commercial crops in many places where foodcrops are being grown at present.

(2) Growth of population. It is quite possible to increase the out-put by the use of improved methods of agriculture. As we shall show later on, this is the only safe method of lowering the present high prices of food products.

(3) Excessive importation of the preceious metals. Any rise brought about by this cause in the general level of prices is not an unmixed evil, because it is accompanied by a proportionate rise in wages, salaries, rents, etc.

(4) Opening up the country. Facilities of inter-communication tend to equalize prices. They raise the prices in places, where they are abnormally low, and at the same time tend to lower them where they are too high.

(5) The building up of real credit. The effect of this is similar to that produced by the third cause. But it must be added, that if this does not exist, no country can be commercially prosperous in this age.

(6) The depreciation of the gold price of silver. This cause and the other allied causes of an excessive importation of the precious metals, and the alleged inflation of the currency during recent years, require detailed treatment. We have of course, no control over the price of silver in the world's market. The only way in which silver can be appreciated to something like its original value, is by the adoption of a silver currency by the leading states of Europe. This, considering the cumbrousness of the metal, is a highly unlikely event. Another way by which its price can be increased in India, is by the imposition of an import duty on silver, sufficient to raise the value of the imported silver to rupee one per tola (Rs. 2-8 per ounce). But as silver is only a precious commodity, in most of the other parts of the world, the wisdom of such a step is doubtful. It is perhaps only just and proper to allow purchasers in this country to buy silver when it is cheap. How far this decreasing purchasing power of the rupee is due to a plethora of that coin is a question almost impossible to answer. There does not exist any reliable test by which the exact requirements of the country with regard metallic currency can be accurately gauged. But there is no doubt that between 1898 and 1908 the quantity of rupees in circulation has nearly doubled. It has been estimated that the stock of rupees in existence before this period was about Rs. 130 crores. During this period about a hundred crores of rupees were coined. It would be a great good fortune of the country, if some automatic system could be invented to control the silver coinage, such as exists in England in respect of the gold coinage.

It is suggested in certain quarters that most of the currency troubles of India would disappear if a gold currency were introduced. There is little doubt that a gold currency being more stable will tend to keep prices in control. Moreover a gold currency, not being a token currency, will probably pull down the present high prices. But there

are two strong objections against the introduction of a gold currency. (1) Unsuitability of a gold currency for our country because the masses of the people have got quite accustomed to a silver currency, and that (2) India is too poor to have a gold coinage. Against these propositions, it may be stated that before 1853 a very large amount of gold was in circulation in India and that in certain parts of Southern India it was very popular. It would be hardly correct to say that there is nothing to prevent the existence of a gold currency even now. It is an established fact, that it is impossible for coins of gold and silver to circulate together at a fixed legal ratio, different from the market value of the metals. As soon as this difference comes into existence the over-rated coin at once drives out the other from circulation. The value of silver is fluctuating, but the rupee is always over-rated in India as compared with the sovereign. Hence the former will never allow the latter to be in circulation to any considerable extent, unless it is almost entirely demonetised. This brings us to the second obstacle against the adoption of the gold currency, *viz.*, the huge magnitude of the task. The amount of gold required would probably be worth not less than 150 crores of rupees, perhaps a little over 200 crores. But there is every reason to believe that the adoption of a gold currency will be followed by many economic advantages. It may also be added that in those parts of India, which are too poor for a gold currency, silver will continue to circulate as now.

The bulk of the metallic currency of India consists of silver ; hence, any lowering of the value of silver, by lowering the purchasing power of the rupee tends to raise up the prices. During the last forty years silver has fluctuated a great deal in price. During the last five years it has twice touched a very low level (nearly Rs. 2½ per oz.), but has soon recovered. Economists and financiers have, therefore, confidently anticipated, this inevitable rise hitherto. Can we always rely on this reaction ? It must be remembered that silver is gradually losing its former position of metallic money, whereas gold is becoming more popular, as a measure and standard of value in many parts of the world. The unstable

value of silver tends to invest it with the character of a precious commodity rather than money. There is reason to fear, therefore, that silver will gradually lose its present normal value, and that a depreciation in its present price will not always be followed quickly by a greater demand. In any case, there does not seem any possibility of its even gaining its former price of $5\frac{1}{2}$ an ounce. Has not the time come, therefore, to reconsider the value of the Rupee? As we have said above there is no likelihood of the intrinsic value of the rupee ever even approaching its token value. In fact, it is often considerably less. We must consider therefore, whether any economic benefits are likely to result by fixing a lower exchange value for the rupee than it possesses just now. Suppose it is fixed at 1:3 there will still remain a sufficient difference between its intrinsic and nominal value, and an opportunity will occur to test this somewhat experimental measure. We shall now try to discuss the probable effects of such a step. What would be or rather ought to be the effect on the export trade? This is perhaps the most important question, because, the normal condition of our trade is a preponderance of exports. With the gradual increase in our manufactures and improvement in agricultural methods the preponderance of exports is likely to increase. A concrete example will perhaps make our position more clear. We are annually exporting tea worth about Rs. 10 crores or about £66,00,000. With the same export we should continue to receive the same monetary equivalent. But £66,00,000 will be worth about $10\frac{2}{3}$ crores of rupees here in India. Hence so far we shall reap an advantage. On the other hand the Home charges will be increased by about $1\frac{1}{2}$ crores of rupees and we shall be at a disadvantage in our import trade. But this condition will perhaps also stimulate production in India and hence will tend to increase the economic prosperity of our country.

It must be admitted that the result of the introduction of a gold currency, or the lowering of the exchange value of the rupee, cannot be foreseen with any definite certainty. But the third remedy suggested by us, namely improve-

ments in the antiquated methods of agriculture in our country is certain to produce beneficial results. That there is ample scope for improvement there is no doubt. To state very briefly the improvements may take the following lines:— (1) Labour may be made more intelligent, and therefore, more productive, by means of widespread primary education. It may be accompanied or followed by elementary training in scientific agriculture. (2) A great extension of co-operative credit system is necessary. (3) Agricultural banks may be established. (4) Irrigation may be extended as much as possible.

Last but not least is the absolute necessity of capitalists and educated people turning their attention towards scientific agriculture. This is sure to result in increased output of rice, wheat, cotton &c., improvement in the quality, and hence the value of products like cotton, and exploitation of many other raw materials which are not utilized at present. It will also give rise to several new agricultural industries like camphor-making &c. In fact it will possibly make India one of the richest countries of the world, and at the same time the enormous output of food products will tend to lower their prices considerably.

APPENDIX I.

THE LAHORE EXHIBITION.

SIR LOUIS DANE'S SPEECH.

The following is the major portion of the exhaustive speech delivered by his Honour the Lieutenant-Governor of the Punjab at the opening of the Lahore Exhibition on the 11th December 1909 :—

PRINCES AND CHIEFS, LADIES AND GENTLEMEN,—

I am glad to find that so many patrons have thought it right and proper to accept the invitation of Sir P. C. Chatterjee and the General Committee to be present at the opening of this Exhibition of the Industries and Agriculture of the Punjab, North-West Frontier Provinces and Kashmir. I am aware that there were doubts on both sides whether or not it was desirable that in existing circumstances, the Government and its officers and the Princes of the States in and adjoining this Province should be closely associated with an Exhibition which was intended to be and is a popular instance of self-government. The stalwarts of the cause of self-government thought that the assistance of Government would swamp their venture, and the ultra conservatives doubted if the cause of self-government should receive the mark of princely and official approval. Gentlemen, I am proud to think that the moderate men on both sides have ignored these doubts and difficulties, and that we were willing and able to comply with the invitations for help and assistance which we received from the Governing Body of the Exhibition, and that, thanks to the cordial co-operation of the States and Government officers with the people of the Punjab, the enterprise has been brought to a successful result in a wonderfully short time. I draw from this a happy augury. For good or evil we are embarked on a career of co-operation in administration. I believe that that co-operation will work for good, and I hail this instance of such co-operation as a foretaste of what this Province may achieve under its new Council which is now in process of construction and which will, I trust, come into full operative life before this Exhibition closes.

Besides, when a body of gentlemen numbering many of our leading citizens, of whose loyalty and good will there can be no doubt, however they may differ as to the best methods of government of this country, requested us to help them in displaying the Industrial and Agricultural resources of the country to the best advantage, it would have been little short of a public scandal if the servants of the public engaged in the task of administering the country had turned a deaf ear. It is possible that if the time had been longer and if the trained

hands of Government officers had controlled the whole arrangements, larger funds might have been collected and there might have been a more imposing show. But I do not think that we need be in the least ashamed of this collection displaying the resources of the Punjab with its daughter provinces of the North-West Frontier and its sister frontier State of Kashmir, whose enlightened ruler, his Highness the Maharaja, is happily present here to-day as a mark of the interest which he takes in the development of his State, and I take it upon me, in the name of the countries here represented, to thank Sir P. C. Chatterjee and Mr. Harkishen Lal and the members of the General Committee and the sub-committees and secretaries for their whole-hearted and most successful labours in the interests of self-government and of the good of the country. At any rate, they need not fear comparison with the past. There have been three previous exhibitions in the Punjab, in 1864, 1881 and 1893; so the time had certainly come round for a fourth. The first Exhibition was housed in what is now the Municipal Market in Anarkali and was a general exhibition much on the present lines. It was very useful and led to the publication of Mr. Baden Powell's "Punjab Products." But what a change there has been! Now it has been difficult to meet the demands for space even with all these commodious buildings and tents and the great open areas round them. Then all was contained in one small erection which is now much too small for the market place of the Civil Station of Lahore and Anarkali.

The Exhibition of 1881 was managed by Mr. Lockwood Kipling, to whom art in the Punjab owes so much, and was a display of the industrial arts of the province. The School of Art building, with a few tents, was sufficient to contain all that there was then to show. The results were most marked upon the arts and crafts of the province, and the Exhibition led directly to the construction of our Museum, of which the foundation stone was laid by His Royal Highness the late Duke of Clarence in 1890. The Museum, with the adjacent School of Art under Sardar Bahadur Bhai Ram Singh, is one of our finest buildings, and contains a collection of which any capital may be proud. Our Græco-Bactrian remains and coins are world-famous, and if our industrial section has not been as complete as it might have been, it is rapidly being brought up to date by the labours of Messrs. Wathen and Mouat Jones, and should with the collections from this Exhibition be a most complete and valuable object school in technology and science for our college students as well as for the public. The building formed the home for the Exhibition of 1893, which, like that of 1881, was mainly a display of Art products and manufactures which served to show the progress which had been made during the previous twelve years.

All these three Exhibitions were purely official, and the present display differs radically in that, it is primarily and mainly the result of private enterprise assisted by the Government officers who have to deal with the major industries of the province, but still non-official entirely

in its management and direction. It is, therefore, a most interesting experiment, and deserves all consideration at the hands of the public, on whose attendance it must depend both for its financial and its educative success.

Let us hope that the present Exhibition, like its predecessors, may lead to permanent results of public utility, and that these results may be as great in proportion as this Exhibition exceeds all former undertakings of the sort in the Punjab.

Perhaps the most marked feature of our present display is that under the Heads of Irrigation and Agriculture. It is right that such should be the case. Our motto is *Crescat a fluviiis*, or May the Punjab grow by its rivers. Of course our province with the exception of the Salt Range tract, literally has grown by accretion from its rivers, but the rivers have not deserted their child. Thanks to the labours of the Irrigation Department, their natural exuberance has been trained and controlled until the whole power of the fertilising floods is devoted to the growth in wealth and prosperity of the province and its peoples. I commend to your attention the Irrigation Exhibit, which shows at a glance how his control over the rivers has been secured and what use has been made of it.

While dealing with the wider aspects of agricultural improvement, the Punjab has not neglected the minor features of the industry. We all know the splendid fruit of Kashmir. The indigenous apples of the State go all over India. The Durbar have under French experts greatly improved the quality of the apples and pears, and as the people generally take to growing these improved varieties, we in the plains of India shall benefit. Then there is the great fruit industry in Kulu. In this I take a fatherly pride, as Lady Dane and myself were the first commercial travellers in Kulu fruit. The pioneers of the industry thought only of selling dried fruits owing to the remoteness of the tract. We felt sure that there was a future for the apples and pears, even, at high prices, and took in the first consignment ever sold to Simla in 1882. It sold at once. For a few years, the Assistant Commissioner of Kulu assisted the growers by establishing a coolie dak, and now the fruit goes all over India and Burmah by post. There is a very large area suited for fruit culture of all kinds in Kulu and the adjacent Hill States, where the rainfall is not too heavy, and if ever the project for a cart-road or light railway, *viz.*, Bilaspur, Suket and Mandi can be successfully carried through, a considerable trade should spring up in the finer qualities of fruit, for which the market in India is practically unlimited. The Pusa researches may show us how to transport the perishable fruits like peaches and apricots, and these do admirably nearer home in the Salt Range. Measures are being taken to teach Forest Rangers fruit cultivation, so that we may employ to its fullest utility this agency and thereby do more to popularise the Department.

I would invite attention to the interesting exhibits of the Forest Department in the shape of a resin still, a consignment of sleepers preserved by the Powell process, and a collection of ornamental and useful woods. The prime object of the Forest Department is to conserve the forests in the hills, and so preserve our water-supply and prevent dangerous denudation. This work they have well performed, though their duty is often necessarily not always locally popular. At the same time they provide the timber so needed for railway construction and building. We hope to do more in this way. At present our soft woods, spruce and fir, are practically unused, as they cannot stand long water carriage. There are enormous areas under these soft wood forests and the Department are now considering if we can devise means of working up the timber at suitable points near the forests and selling it ready for fixing. At present it is actually cheaper to use Norwegian deal in Dharماسala and Simla than country wood, as it is sent out ready planed and grooved for use. We ought to be able to put our local timber on the market at rates which would render this impossible. Then there is the question of wood pulp. The soft timbers in Amercia are being largely used for this. The demand for paper is steadily increasing in India, and with electric power on the rivers there should be an opening of a great industry here. I hope that many years will not pass before an experiment is made.

You will find interesting exhibits of the Agricultural Department by which it is hoped to interest people more in the cottage industries of bee keeping and poultry rearing. Bees are kept now all through the hills but they are reared in the old unscientific way which has been rejected in Europe, and the wax and honey are put on the market in a very unmarketable form. We hope to induce the people to dry frame bives and more scientific methods, and to see if bees cannot be reared in other parts. The proper sort of bee exists in the Salt Range, and in all sub-montane districts bee-keeping should be possible, as in the very hot weather and rains the hives, as in England and Kulu, could be moved up to higher and cooler regions.

For poultry in the Punjab there is a great market, and the conditions are quite suitable. With incubators a good stock can soon be reared, and the Department are securing good breeds from Europe as well as the excellent variety from the Lolab valley in Kashmir, where the people are already to a great extent experts. Poultry farms will be started in Lahore and at Lyallpur, and I hope at Shahpur or Sukesar; and the Jhelum District Board have already imported birds of their own and the necessary machinery for an up-to-date poultry industry.

Such cottage industries are most valuable as bringing grist to the family mill, and all classes can take to them and so provide useful and interesting work for those of the family who at present do little or nothing towards keeping the pot boiling.

Fisheries cannot assume so prominent a position here as in Bengal and other provinces. But the subject has not been neglected. Here again Kashmir has led the way, and brown trout have been most successfully acclimatised there by the Director of Pisciculture, Mr. Frank Mitchell. The fish are now breeding there, and, thanks to the courtesy of the Darbar, they have been successfully introduced into the Beas in Kulu, and it is hoped to start the industry elsewhere wherever conditons allow the temperature of the water in the stream to sink to a sufficiently low point to admit of natural reproduction.

The very interesting exhibit of scientific fish culture which the Fishery Department of Bengal under Mr. Ali Ahmad has kindly sent up deserves close study. The Department was started by Mr. Krishna Govinda Gupta who has honoured us by his presence here to-day. I am sure that at any rate this is the first Exhibition in India which has been so honoured by the presenee of a member of the Council of the Secretary of State. We have not the numeorous perennial streams and tanks which exist in Bengal, and the intermittent flow of our canals and rivers militates against a great fisheries industry. But it ought to be possible to provide suitable shallow reservoirs in or alongside our canals to keep the fish alive during closures and to provide suitable spawning and rearing grounds. Our great pondage reservoirs, too, if they are ever taken up would be ideal sanctuaries for all kinds of fresh water fish. The matter had already been under consideration, but now stimulated by what has been accomplished in Bengal, we shall lose no time in taking up seriously the question of what may prove to be an important addition to the food supply of the country.

In the Fishery Exhibit you will also read of the small fish of the Barbados known as millions and see the corresponding Bengal fish which are said to reduce the mosquitoes by living on the larvæ. I am sure that we shall all welcome these interesting strangers and give them every facility for gratifying their most admirable taste in diet. Any and every means of reducing the malaria scourge, whether it be sanitation, or drainage or quinine prophylaxis or mosquito destruction, are welcome, and all will have a fair trial, as this scourge is one of the greatest evils with which we still have to deal in the Punjab. I do not know that sanitation is altogether an industry, but as good sanitation is essential for all industries, the Exhibition authorities make no apologies for showing a most valuable exhibit under this head. You will also see in this section the whole process of making quinine tablets. We hope to be able to sell five-grain tablets at one pie a piece or three for a palsa or 12 for an anna. Let us hope that with millions for the mosquitoes and quinine for the millions we may be able to do something at any rate to reduce the terrible sickness and mortality due to malaria. The Sanitary Department are also showing types of sanitary and insanitary houses for peasants and others. In the matter of sanitation

however, Government cannot act alone and I, therefore, earnestly beg all men of education and influence to come forward and help us in our formidable task of teaching the people the advantages of sanitation and of inducing them to do what they can to carry out the lessons which they are taught. The exhibits are an excellent object lesson which all should study.

I am sure that you will agree when you have gone over the Exhibition, that much has been done for agriculture and its subsidiary industries and we may hope that with the opening afforded by the Agricultural College and the expansion of science classes in our other Colleges, the people of the country will themselves turn to the study of this the first and still the most important industry of all. Experience is a good teacher and the people of the Punjab are admirable farmers, and know well how to cultivate the staples available to them. But science still can do a great deal to improve those staples and to introduce others, and to trace the causes and ascertain the cure of blights and plant diseases, and last, but not least, to prove the value and to reduce the cost of artificial fertilisers which are not at present known to the people or within their purchasing capacity.

Then there is the case of Sericulture, and here we must acknowledge our debt to his Highness the Maharaja of Jammu and Kashmir. Owing to disease of the worms, silk cultivation both in the Punjab and in the State had practically died out. My friend Sir W. Lawrence, as Settlement Commissioner of Kashmir, conceived the idea of starting it again, and was warmly supported by the Durbar. With the assistance of the Resident, Sir A. Talbot and the advice of Sir T. Wardle of Leek, whose recent death has been a great loss to sericulture in India generally, the industry was revived and eggs were imported free from disease from France and Italy. In the earlier years the usual checks occurred, and I am happy to think that I was in part the means of strengthening the determination of the Durbar to persist in the experiment and of placing it on a good working basis. The success achieved has been phenomenal. You will see for yourselves what magnificent silk Kashmir can produce and what lovely fabrics are being woven of it in the valley. The industry in 1908 gave employment to no less than 76,000 persons in growing the silk, 19,000 rearers and their families, and to over 8,000 persons in spinning it. A sum of Rs. 4½ lakhs was paid out as the price of cocoons and over 3 lakhs went as wages to the spinners, while the Durbar reaped a net profit of Rs. 6½ lakhs. The industry has gone far to replace the old shawl industry, which, owing to changes in fashion, had sadly decayed, bringing ruin upon the unfortunate workers. Shawls are still made, however, and at any time a change in fashion may revive what was the leading industry of Kashmir, and the Darbar will, I am sure, be ready to seize their opportunity.

This success in the sister State has emboldened us to attempt the

revival of the sericultural industry in the Punjab, and we have already made a small but promising beginning on similar lines. The conditions are of course not so favourable as we have not the resources of the Durbar or its command of money, materials and labour ; but I am hopeful as to the future, and I commend the industry to the notice of the capitalists present. The silk market, especially in America, is rapidly expanding and is large enough to take at very remunerative rates all the silk that India can produce and to clamour for more.

There is another very special feature of the Kashmir silk industry which brings me to a subject very near to my heart and one which I believe to be at the foundation of any great industrial development in the North-West of India. The filatures are lighted and run and the basins are heated by electricity. Gentlemen, we owe a great deal to the Protected Princes of India. In many directions they have shown us the way, but in none have they done so more boldly and more successfully than in electrical developments. We all know the happy results of the Mysore Durbar's daring experiment of harnessing up the Kaveri Falls and carrying the power 92 miles to the Kolar Gold Fields. For this that veteran statesman Sir Sheshadri Aiyar was responsible. I am glad to see here one of his distinguished successors Mr. Madhava Rao. For years I had thought over the possibilities of developing the great water power of our rivers and canals, and I bequeathed my ideas to Sir L. Tupper when I left the Punjab. In Kashmir it appeared that something might be done on the Mysore lines. I approached the Durbar, and his Highness Maharaja took up the idea at once. His chief minister and brother Raja Sir Amar Singh, ably supported his Highness' views. Gentlemen, I would here ask you to join with me in expressing to his Highness the deep sympathy which we all feel with him in the irreparable loss which he and the Durbar have sustained this year in the death of his brilliant brother. I had known him ever since I came to India, and, as he was a great personal friend of mine, I can confidently say that I have met few men his equal in force of character and great administrative abilities. His thoughts and energies were always directed to the welfare of the Durbar and of the State, and it must have been some solace to him in dying to think that he, working as his Highness' chief minister, had succeeded in placing the State on a sound basis of well-ordered government and prosperity such as it had never enjoyed even in its palmiest days, with the most brilliant prospects of future advancement and wealth.

Well, Gentlemen, the Darbar invited Major de Lothbiniere to help them. He expanded my more humble ideas, and leaving the Sind and Lidhar projects boldly tackled the Jhelum itself as a source of power, and there exists at Mahura near Baramula a plant capable of generating 20,000 H. P., of which 15,000 H. P. is at present available for industrial enterprise ; and I invite the attention of capitalists

to this great opportunity of developing the industrial resources of the fair valley of Kashmir in the confident hope that the Durbar will meet their overtures in a fair and liberally-minded spirit. But this is not all that the Jammu and Kashmir Durbar have done for industries. It was largely their liberality which has enabled Mr. Brennan to complete the full-sized model of his gyroscopic mono-rail which has recently been tested with success in England. We have hope that this would revolutionise the prospects of a railway to Kashmir and of feeder lines and branch railways in India, and especially in hilly tracts. For this reason the expensive project for a steam line up the Jhelum valley has been held over, and I congratulate his Highness warmly on his foresight. I confidently now look for the completion of a Brennan line joining his summer and winter capitals which will open up his whole State and render possible the development of the iron, coal, copper and bauxite resources, which he has had under earnest examination for the past eight years.

These States have thus gloriously set the way in electrical developments. They can do this as they are happy in the possession of disposable capital and of a more flexible system of government capable of acting without undue discussion and delay. Here in British India we are hampered by the fact that there is no stored-up State capital, and we have to depend on loans for public works. Loan capital cannot well be expended on new ventures, and so development is hindered. A Provincial Government has not even this resource of loans, and the funds at its disposal barely meet the humdrum necessities of administration and leave nothing over for developments. I suppose it must be so, but, seeing the opportunities that exist in this country and the profitable use which a good and far-seeing officer is able to make of any small amount of money that he may be able to secure, it has often filled me with despair to see how such good officers are shackled lest their less go-ahead and far-sighted brethren should do harm. However, personal government may have had its day, though personal energy and influence will still always make themselves felt. Corporate effort may make good the defects now apparent and at any rate we must all loyally endeavour to make our new venture a success which it should be as the spread of education opens out vistas of hope that our young men will apply themselves to the development of their country in reality and so this glaring deficiency of our system of administration as contrasted with that of the States may be wiped out.

At any rate something has been done even in existing circumstances to place the North-West Frontier and the Punjab somewhat on an equality with Kashmir in the matter of that power without which no real industrial development on a great scale can take place. It was my good fortune to be able to point out to the originators of the Upper Swat Canal that they had a great potential source of power in the

tunnel through the Malakand. The designs were altered and we have secured there a fall which will generate up to 25,000 H. P. in the centre of a tract which teems with prosperity and is endowed with a most enterprising population, and which can best be developed by electrical railways, if it is to reap to the full the great advantages it will enjoy, when the whole canal system is opened up.

Nearer home, the Punjab Government has been earnestly scrutinising all possible sources of power. There are the small pioneer works of the Sujampur Sugar Works and the Dhariwal Woollen Mills on the Bari Doab Canal. A suitable site for some 9,000 H. P. exists on the Bari Doab Canal near Madhopur and another on the Western Jumna at Dadupur. We are proposing to harness up the Tarn Taran fall near Amritsar to work the canal workshops and meet the municipal requirements for power and also to pump from the over-saturated subsoil. In this way we hope not only to unwater swamped tracts and diminish the sickness due to malaria, but also to provide new and increased sources of irrigation and so benefit the country in both ways.

Most of our canal sources of power, however, are open to the objection that during canal closures no power can be generated, and on canal branches such closures are, and must be, not infrequent, owing to the paramount necessities of the irrigation system. We have, therefore, turned our eyes further afield, and hope to secure larger stations on the rivers before they leave the hills. One such station is being equipped on the Nauti Khad near Simla, where it falls into the Sutlej. This will furnish a perennial supply of power sufficient for the needs of Simla, and perhaps also for a timber and wood-pulping industry which it is hoped to establish on the Sutlej. The scheme is the result of a suggestion of the Simla Extension Committee of 1898, and, though a small thing in itself, may prove the pioneer of more important undertakings.

Other sites have been examined on the Chenab in Jammu and on the Sutlej and Ravi in British Territory. Enough has been done to show that in our rivers we have a practically unlimited source of perennial power supply though it may be years before we shall require these. One source of power will, I trust soon be available. The Upper Jhelum Canal at Rasul runs about two miles away from the Lower Jhelum Canal Head Works, but at an altitude about 78 feet above the lower canal. It will be necessary to feed the lower canal from the upper channel in order to avoid losses in the river bed, and 5,000 cubic feet of water must be passed from the upper into the lower canal. By dropping this over the high cliff at Rasul into the Jhelum, a fall of perhaps 70 feet can be secured, which will, if required, yield some 35,000 H. P. When the Upper Jhelum Canal is opened Rasul will be a fairly central point for the whole of the western canal tract and close to the portions of it best suited for cane and cotton. It is also close to the healthy highlands of the Salt Range which can never suffer from

excessive irrigation. The supply will be almost perennial, as, except for closures for repairs, the Uper Jhelum Canal must run always. The power should be available within two years, and all that is wanted is to secure a market for it. Here we must mainly rely on the assistance of the public, but such a market might perhaps be obtained in part in the great salt mine of Khewrah, turning out with primitive appliances some 115,000 tons of salt a year. The conditions of labour and the outturn would of course be enormously increased by the application of electrical power mechanical cutters and light, and the cost of production would be much reduced. Here again the question of markets comes in. Should we find a market for the increased output? This should not be impossible, as German salt now competes with Indian salt as far up country as Patna, and if industries increase a greater consumption of salt in these will be a natural result: while eventually with cheap railway rates and facilities a market overseas may be opened. The quantity of salt readily available on this one site is inexhaustible, while its quality and purity are of the highest grade. The salt mines of the Salt Range and of Kohat form one of our greatest industries in North-Western India, and I should be very loth to see anything done which would injure the prospects of our hardy salt miners. But the introduction of machinery would not do this, as there is another market for their labour at higher prices at their doors in our Salt Range coal fields. Private enterprise is at last beginning to nibble at the edge of this. A coal of better quality has been found in the Isa Khel tahsil across the Indus and the Geological Department now believe that coal exists widely over the plateaux on the crest of the range, of which at present only the outcrops are being worked. This coal may also be of better quality, and at the instance of the Local Government an attempt is now being made to probe the field by deep borings. If successful there will be a great field for the employment of cheap electrical power within 50 miles. The Mayo Salt Mine is only 31 miles from Rasul, and with the modern improved transmission such distances are simple. The products of our coal and salt mines and accounts of the industries are all on view in the Exhibition and again I invite the attention of capitalists, so that some relief may be given to Government, which is at present bearing practically the whole cost of developing the coal field.

So far I have dealt mainly with the great primal industry of agriculture with its handmaid irrigation and with the basic elements of industrial success in the form of power. I am not, I am afraid, competent to deal with the Ladies' Section, and I must refer you to Lady Dane. This and the allied exhibit of the School of Art will, I am sure, attract as much attention as the more serious and less interesting features of the Exhibition with which I have been dealing, while I look to the competitions in the arena and to the side-shows to relieve the tedium of too much science, as I am a firm believer in the truth of the old adage of all work and no play makes Jack a dull boy.

On the question of minor industries, I need not detain you long. The carpets of the Punjab and Kashmir have long been famous, and you will find excellent specimens of the art here. Happily here private enterprise has come forward to relieve Government, but we must not forget that the industry was started by Government in the jails, though these are dropping out of the field as private enterprise meets the public demand.

Of the products of other industries of the province in the shape of yarns, textiles, woollen, leather work, flour and biscuits, the Exhibition contains a good show. Our factories have grown from seven in 1881 to 264 in 1909. The capital invested in cotton and woollen spinning and weaving mills in 1891 was 17 lakhs of rupees, it is now over 80 lakhs. It is not a very brave show as compared with other provinces more favourably situated as regards power, but all credit is due to the pioneers of this important branch of industry, who, in spite of the almost prohibitive cost of coal, have managed to hold their own with rivals working with cheaper fuel and possibly cheaper labour. In 1881 the paid up capital of Banking and Insurance Companies was only 18 lakhs, in 1891 it sank to 12 lakhs, but has now risen to 42 lakhs. Our general trade has fully shared in the general development of the country. Imports have risen from three million maunds, worth two crores of rupees, in 1868-69 to forty million maunds, worth twenty-six crores, in 1908-09, while exports have increased in the same period from three million maunds worth two and-a-half crores, to sixty-three million maunds, worth twenty-nine crores. I have referred to the enormous exports of raw agricultural produce. Much of this consists of cotton and oil-seeds, both of which might with the greatest advantage to country be worked up locally and the manufactured article exported. The growth of irrigation ensures a steadily increasing output and even our cautious agricultural experts allow themselves to hope that they are on the brink of the discovery of a class of cotton suited to the soil and climate which will fetch a much higher price in the market. The results of the sale of this improved staple are as follows :—

		<i>Acres.</i>	<i>Md.</i>	<i>Selling at Rs. above ordinary cotton price</i>
1908	...	537	3,300	1.7.
1909	...	1,054	4,750	1.8.

Then, too, much can be done to improve our sugar output. At present we are working in a peddling way with small separate presses and boilers scattered all over the country. Modern inquiry shows that to be successful in these days of cheap transit charges, there must be concentration and co-operation, and that in the case of sugar especially the battle is to large mills in the centre of a tract devoted mainly to sugar-growing. Such tracts exist in the Punjab. I would instance the Raiarki tract and the country round Aliwal in the Batala tahsil and the

central tract on the Western Jumna Canal where excellent cane is grown and where water power is available. The Sujampur Sugar Works in the Pathankot tahsil were not a great success on sugar alone, but they were put in the wrong place just outside the sugar-growing tract and their difficulty in carrying sugarcane is only another argument in favour of the policy of concentrating effort in small areas devoted mainly to cane. Here again the Colonies may help us, as 56,000 acres of cane were raised in the Chenab Colony last year with very satisfactory results in a tract where cane was absolutely unknown before, while the output of gur on the canals amounts at present to three million maunds. Some form of co-operation would secure the necessary capital, and I trust that our Punjab agriculturists will not fail to seize and make the most of their opportunities now while they still have surplus of income over expenditure, and not fritter this away until the growth of population checks their present prosperity.

The mention of the Sujampur Works started by Mr. Frank Halsey reminds me of our important Woollen Factory, the Egerton Mills, at Dhariwal, opened by his civilian brother. Though he shared the not unusual fate of pioneers of a new industry established without a full backing of capital, and his company eventually failed, his enterprise was on the right lines, and the fortunate purchasers have reaped a large profit from his labours, and his memory as one of the pioneers of industry should not be forgotten. Their goods are known all over India and are all on view here.

Then we have specimens of hand looms of all kinds, including the improved fly-shuttle and special automatic looms by which we hope to relieve the labours and increase the incomes of the important class of cottage weavers in this province. The Salvation Army are taking a prominent lead in this matter and hope eventually to be able to enable even the criminal tribes, who are at once our anxiety and our despair, to gain an honest living. I invite you all to view their pavilion and to see and buy the Dane horse jhuls and suitings. Unfortunately I shall not share in the profits of your large purchases, as I have no share in the concern, though the Provincial Weaving School is known by my name.

It is worth noting that even at Dhariwal some 140 fly-shuttle hand-loomers are working for certain classes of cloth, so there is no reason to despair of the future of our hand-loom weavers; while the fact that the Dhariwal authorities have been able to teach local boys of all classes to work in their mills is an augury of hope of the future supply of mill hands for the province generally.

The glass factory at Ambala has sent in a small but interesting exhibit. This too failed to secure the success which it deserved when first started, but it is now being conducted on sound business lines, and in view of the ever-increasing demand for all kinds of glass in the province, it ought to have a great future. It is curious that such a fac-

tory has never been started before, as the indigenous glass work at Panipat have been in existence for centuries, though unfortunately they have never attempted to go beyond the rudiments of the industry.

Then there are the Sialkot Ubeeroi sports factories, at which you can acquire materials for every sorts of game. These are already world-famous and export to England and even to Germany. We have also the pottery and tiles of Multan and a most interesting exhibit of porcelain from the adjoining State of Bikaner, whose enlightened ruler has taken a lively interest in our Exhibition. He has also sent the beautiful stone pavilion at the end of our main arcade, and I would draw attention to the splendid resources of this State in stone and the artistic manner in which that stone is worked up. The quarries are nearer to us than Agra, and there should be a keen demand for their produce in this province. Then we have the marble and stone of the Narnaul quarries in the Patiala State which only need a market for their full development, and the slates and slabs of the Punjab Slate quarries of Rewari and Kanyara in Kangra. I must not, however, weary you with a detail of all the industries of the Province. You have a microcosm of them all here and the Local Government is preparing, through the agency of Mr. Alma Latiffi, I. C. S., and the Director of Industries, Mr. Hamilton, a revise of the monographs of all our industries in which they will be brought up to date and set forth to tempt the capitalist to embark on them.

Annually one or two students are being sent to Europe at Government expense to study various industries,—textiles, tanning, mining, glass working, &c.—and these experts on their return should be able to teach others and so assist in the expansion of industrial effort.

His Majesty's Secretary of State has recently sanctioned the proposals of this Government for an improved Engineering School where we shall train sub-overseers, drivers, fitters and mechanical and mining engineers generally. At present this is the class of men of whom we stand in special need, but I do not propose to stop at these, and I have every hope that a College department will soon be added to the school where we can train our young men for the higher branches of the profession. I propose, for the reasons which I have already given, to locate the school at Rasul, whery the students can see with their own eyes some of our greatest engineering triumphs and study mining practically. It is healthy, not too near a large city with its demoralising influences, and sufficiently far north to prevent the School and College from competing unduly with Roorki. Great though the record of Roorki is, and deservedly so, still we employ more Government engineers in the Punjab than any other province does, and it is quite time that we should train our own men and not be largely dependent on the leavings of other provinces. I have already received a promise of Rs. 10,000 towards the cost of this School, and I trust that others will follow the excellent example set, and so enable us to evolve an institution worthy of the three countries whose

wants it will meet. Such a college would be a fitting and lasting memorial of this great Exhibition, and I trust that the Public will co-operate with Government in starting it on suitable lines from the very outset so that no time may be lost in giving opportunities to our young men to qualify for the industrial arts at least equal to those which they will obtain for agriculture at the Agricultural College.

In any case this Exhibition will leave a landmark, as the ground on which it is being held will form part of the Minto Park, which I hope to see ready before I give over my office, and which will form at once a memorial of the historic visit of the author of the Reforms, to this city, a most picturesque and beautiful setting to the old royal building in the old Fort which lends a peculiar distinction to this site, and a convenient pleasure resort for all classes of the capital of the Punjab.

I am afraid, Gentlemen, that I have trenched too much on your good nature, but it seemed to me that, just as we are at the parting of the ways in the matter of the method of administration of this great province, it was only right and proper that we should take stock of the past history of agriculture and industries in the North-West of India and review our present position and future prospects. It has been my good fortune to have spent almost my whole service of 33 years in the Punjab, the North-West Frontier and Kashmir,—in fact in the Punjab as it was up to 25 years ago and as it is still shown on the maps of the Survey Department and as our Exhibition treats it—and to have held appointments which enabled me to see at first hand much of what has been done in these lines. I have, therefore, ventured to ask you to view the situation through my eyes. They are the eyes of a sanguine observer, perhaps even of an enthusiast. But, Gentlemen, without enthusiasm nothing yet ever was accomplished in this world. The cautious creeping creature who let "I dare not wait upon I will" has never done anything in life. A man who never made a mistake has never made anything. The countries here represented have been great in war. The Punjab furnishes not only the backbone, but almost the whole frame of the Indian army, the North-West Frontier is the lance-head, and his Highness the Maharaja of Kashmir is the Sipar-us-Sultanat, the shield of Empire. They are equally great in agriculture, and I see no reason, with their great natural advantages, why they should not be equally great in industries and manufactures. But a timid policy will not secure that greatness, and if success is to be achieved, the talent must not be hid in the napkin. A wave of prosperity has come to us; let us seize the opportunity and devote the combined wealth and brains of the community to establishing our manufactures on a broad and stable basis, so that founded on the twin rocks of agriculture and industry, the prosperity of the Punjab in its widest sense may be secured for generations. I apologise also for the somewhat undue prominence of the personal pronoun in my remarks, but here again I was bound to give you the authority for my story. Though all authorities enjoin the

necessity for taking the long view in such matters, it may be that I am looking too far ahead, and that our power resources will not be utilised for years. This is more than possible, though it is a grievous thing to contemplate any serious delay in a matter so vital to the best interests of the country for if neither water power nor coal is developed, our industries must remain dormant, and others will benefit by the working up of our raw produce which we should do ourselves. My visions may be but dreams, though golden ones. Still I can appeal to practical successes in the past. I have devoted the best years of my life to the consideration of all possible contingencies and I have confidence in the future. I shall not see the realisation of these schemes as my term of service draws rapidly to its close, but happily we do secure a continuity of administration, and, if the schemes are sound and stand the test of criticism, my successors will follow where I have trod. In any case it will always be one of my most cherished memories that I was privileged to take part in this interesting ceremony, supported by the help and presence of the ruling princes of Kashmir and of the Punjab State whose interesting courts are some of the main features of the Exhibition, and sustained by the sympathy of the Chief Commissioner of the North-West Frontier; that I was able to bear my testimony in public to the great services rendered by the officers of the Irrigation Department and others who have worked in the battle-fields of peace for the benefit of the country; and that in opening this great Exhibition organised primarily by the advanced leaders of political thought, the other patrons and I were able to show our good will towards all workers for the public good and our earnest anxiety to assist any project which tends to the betterment and prosperity of the provinces and States here represented. If any of the ideas suggested by this Exhibition, fertile as it must prove in such ideas, fructifies for the benefit of the people, we shall all of us have reaped an ample reward, and in opening the Exhibition, I invite you to join me in thanking the organisers for their public-spirited efforts for the common weal and in wishing them all possible success in their venture.

I declare this Exhibition open in the name of the greatest patron of all the arts and industries of Peace—His Majesty the King-Emperor.

APPENDIX II.

COPY OF LETTER, DATED 17TH DECEMBER, 1909.

FROM Mr. R. P. KARANDIKAR OF SATTARA.

In connection with the subjects for discussion by the coming Industrial Conference at Lahore, I have to draw your attention to the necessity of inviting the Conference to consider two of the most important

industries, that stand in need of help just at the present moment. I have already in a communication to the *Times of India* pointed out how desirable it is that a serious effort should be made in order that the Paper Pulp available from the Himalaya trees must be used by Indians for India.

Another of the Industries is that in respect of Turpentine available from the Chir, (cheed) trees. The summer before the last I visited the source of the Ganges and was struck with the awful capacity of these giant trees to produce turpentine. The whole subject is discussed in the issue of the 15th October last of the Journal of the Society of Arts, London.

Thanking you in anticipation in helping a useful discussion of these subjects at the coming Conference.

APPENDIX III.

JAMNAGAR, 20TH MAY, 1910.

SPENCE COTTON.

To

THE GENERAL SECRETARY,

Indian Industrial Conference, Amraoti.

SIR,

The dangerous shortage in the world's supply of raw Cotton is well known to the Textile Industry, and so seriously affects directly and indirectly our whole Empire that I feel no further reason is necessary for bringing the subject before your readers.

Some years since letters appeared in the Press of India on the subject of "Spence Cotton" to the cultivation of which I have since devoted all my time. The accompanying Statement on the subject will, I trust, prove of interest.

Probably never in the history of the Cotton Trade of the world has the interest and attention of the public and press, both in England and India, been so irresistibly drawn towards it as during the past three years.

The Cotton Industries of England and Europe are practically dependent upon one source of supply, *viz.*, America. This has been, and is, the cause of great anxiety, and in 1904, when there was a very short crop, the American operators, assisted by the statistical position of the moment, raised the price to the abnormal rate of 9d, per lb, which was most ruinous to Lancashire. (The average price of American Cotton during the previous ten years being about 4½d, to 5d, per lb.) Moreover, there is the further and more serious danger of bad weather and frost in America, injuring and diminishing the crop, "Spence

Cotton "cultivated in India cannot fail from want of rain, because a system of artificial irrigation by wells is adopted wherever it is grown, and, further, there is no frost in the districts selected.

Since that time great efforts have been made to grow Cotton in Africa, Jamaica, and other parts of the world, in order to avoid a repetition of such a grave calamity. It is not only necessary to increase the supply of raw Cotton, but also to produce a quality suitable to the Mills of Lancashire. The total production of the world being annually about 8,000,000,000 lbs., which valued at 6d. per lb. amounts to about 200 millions sterling, of which India produces at present only about 1,400,000,000 lbs. of Cotton, which is of such inferior quality suitable generally only for the manufacture of low counts, that it is practically boycotted by the Lancashire Mills, and consequently very little of it finds its way into England.

Mr. J. R. Spence, who was for many years a Member of the Liverpool Cotton Brokers' Association, and who has had five years experience in Egypt, and further has visited every Cotton-growing centre in India, discovered some five years ago a Cotton tree indigenous to India, producing Cotton superior to American, both in classification and staple, and quite as white in colour.

Mr. Spence has traced its origin locally as far back as the Mutiny of 1857. It is supposed to have been originally introduced from Parnambuco (Brazil). Impressed with the commercial value of this Cotton, he started a Plantation at Deesa to cultivate it on scientific lines, and has now about 200,000 trees.

The yield for the first year averaged 2½ ounces of clean Cotton per tree, notwithstanding the season was the most disastrous known for many years. Over 5,000 trees are planted to the acre, and this gives a net yield of, say, 800 lb., or two bales per acre, the first year. The average yield for the second year has proved to be more than double that of the first year, and as after the first year half the number of trees are transplanted, to give room for increased growth, each acre would still produce at least two bales. When it is pointed out that the average yield per acre of ordinary cotton all over India is about 50 lb. per acre, the enormous advantage of the cultivation of "Spence Cotton" will be seen at a glance. Whereas the ordinary cotton plant is cultivated as an annual requiring to be re-sown every year, and cannot generally be grown on the same land two years in succession, "Spence Cotton" improves each year both in quality and quantity, and trees have been proved to continue bearing for a period of 20 years. This again means an enormous saving in the cost of production.

The boll worm, one of the dreaded pests of growing cotton, has lately been very prevalent both in America and India, but up to the present time Mr. Spence's plantation has escaped from this pest as it is thoroughly fumigated at intervals which entirely protects it from this danger.

"Spence Cotton" was sold on 1st August, 1907, in Liverpool, at 7½d, per lb., or 68 points over mid-American, August delivery. It is the first time in the history of the trade that such a rate has been obtained for indigenous Indian Cotton.

It has been manufactured into cloth by Messrs. Wadia & Co., Bombay, who write as follows:—

"J. R. SPENCE, Esq.

Bombay, 11th September, 1906.

DEAR SIR,—We have passed the 4 bags of "Spence Cotton" through the processes of spinning and weaving, and have now the pleasure to forward you herewith sample of cloth made therefrom, which we believe is the finest that has ever been made in the power looms from Indian grown cotton. The cloth is made from 40s. warp and 50s. weft, and from this trial we are satisfied that the cotton will spin a good 50s. warp and 70s. weft. From this cloth can be made fine dhoties for which a great demand exists in India, particularly on the Bengal side, thanks to the Swadeshi movement. To be able to grow such cotton is one of the best things that the Indian Mills could wish for, and will open up quite a new and very profitable trade, if they will get machinery suitable for the longer staple. If we had had a larger quantity of cotton with which we could have continued the trial, making necessary changes, we are sure a still finer cloth could be made from it. The total loss of weight in blow-room is only 3 per cent. and we would gladly give 7 annas per lb. for this cotton."

NOTE.—The loss in weight in blow-room of Middling American is about 12 per cent. Seven annas equals 7 pence, and this price was at a time when "Middling" American was worth 5½d, per lb.

Based on the experience of the past five years the cost of production including European supervision is Rs. 150 or £10 per acre, which is equal to 3d. per lb., on the yield of 800 lbs., to the acre. All items of expense are calculated on the most liberal scale, considerably over Government figures for the cultivation of cotton from Egyptian seed in Sindh. This initial cost of 3d. per lb., would materially decrease after the first year and it will readily be seen an unusually large margin of profit exists at the present time in the scientific cultivation of "Spence Cotton."

I am now engaged in conjunction with His Highness the Maharaja Jam Saheb of Nawanganar in cultivating 500 acres in his State with the object of proving the figures given. The following is an account of the present condition of the Plantation here from the *Official State Gazette*.

THE DEWAN SAHEB,
Nawanganar State.

VIJARKHI, JAMNAGAR,
6th May 1910.

"We are glad to be in a position to send you most favourable accounts of the present condition of our "Spence Cotton" Plantations at Vijarkhi and Alia. The whole area of the former has been ridged

some time, the work being highly satisfactory as you will remember stated on your recent visit of inspection. We commenced planting in the middle of March, the seedlings appearing after only being three days in the ground, this is a world's Record for March planting, the usual time in India almost invariably being after the first rain in June, when the soil and atmosphere are comparatively cool. The impression in India is that earlier planting is absolutely fatal from the fact that the seedlings would certainly be burnt up by excessive heat from the sun, indeed we have repeatedly been strongly warned of this danger, but it has been entirely avoided by our methods of cultivation and the formation of our Ridges, which are two feet high and five feet apart, some of them being more than a mile long; being soft and properly watered they keep cool during the day and absorb the dew at night, the result being that we have not lost one of our millions of seedlings. Cotton planting on the flat is absolutely fatal in this country and principally accounts for the fact that India's yield per acre is only about one-fifth that of America and one-eighth of Egypt. Our Vijarkhi Plantation is now a perfect show and far excels anything we have seen during five years experience of cotton tree cultivation, the plants are in groups, five feet apart on the top of the Ridges, the whole area is planted with the exception of a plot of about ten acres of high land which proves troublesome to water, no yellow leaves are to be seen and there has been no sign of insect pest, this speaks most highly for the fertility of the soil.

At Alia the ridges are progressing well and all will be finished before the rains, which will complete our total area of 500 acres: planting commenced a few days since and is being rapidly pushed forward, the seedlings appeared here after three days planting as they did at Vijarkhi, and we have no reason to doubt they will be equally successful.

It is of course far too soon to make any forecast of the probable yield, we will do so later on when we have sufficient data to go upon. We can only say that so far the present condition could not possibly be more satisfactory than it is, and that in our experience we have never seen any plantations of the same age to compare with them.

I desire to state that it is entirely due to His Highness the Jam Saheb that I shall soon be in a position to prove on a commercial scale the yield I obtained the first year on my Deesa Plantation of 800 lbs., or two bales to the acre. When this is established it will be seen at a glance that the cultivation of the "Spence Cotton" indigenous Tree is the true key to the future supply of raw material for the Textile industry. India with labour at four pence a day and nine months without rain is the only country under the sun where with irrigation by Tanks or Wells, the cultivation of Cotton can be carried out positively with no risk. The danger of insect pest is entirely avoided by fumigation which every sensible cultivator adopts as a precaution whether his crop is attacked or not.

His Highness the Jam Sahib took the deepest interest in the cultivation of "Spence Cotton" when it was first put before him, and fully realised its immense importance to his State and India. Its future success will be mainly due to his individual energy and the enterprise of all people both in this country and at home. His Highness has proved one of the very few who have practically enabled me so far to bring my undertaking to a successful issue, and he may be justly considered as the Pioneer of the enterprise.

It took twenty years to prove to India that Tea could be cultivated as an indigenous Tree instead of an exotic, so perhaps I should not complain that my work during the past five years has not yet convinced this country that Tea and Cotton should be cultivated alike.

The finest quality of "Spence Cotton" I have yet seen was from a Tree said to be forty years old, it was two feet in circumference, and was covered with thousands of bolls—being situated at the junction of three fields which were well irrigated and cultivated, it had always a sufficient supply of water.

Yours faithfully,
J. R. SPENCE.

APPENDIX IV.

RESOLUTIONS OF THE FIRST INDIAN INDUSTRIAL CONFERENCE

HELD AT BENARES ON THE 30TH DECEMBER, 1905.

I

Resolved that this Conference urges the Government of India and all Provincial Governments and administrations, as also the people of India according to their powers and opportunities,—

- (1) To found Technical Schools in all large centres for the industrial education on an adequate scale of the Indian people,
- (2) To encourage and help Indian manufactures,
- (3) And to foster and extend the use of such manufactures in India in preference to foreign goods.

Proposed by the Honourable Munshi Madho Lal (Benares).

Seconded by Mr. A Chowdhri (Calcutta).

Supported by Mr N. Subbarao (Rajahmundry).

II

Resolved that this Conference urges all Provincial Governments and administrations as well as the proprietors and managers of private schools and colleges to add commercial classes, and industrial classes

like those of weaving, dyeing, carpentry, &c., to the existing educational institutions where practicable.

Proposed by Mr. G. Subramania Iyer (Madras).

Seconded by Mr. Ali Mahomed Bhimji (Bombay).

III

Resolved that this Conference specially invites the attention of Indian capitalists to the great importance of introducing the use of improved hand looms among the weavers of India, and recommends the establishment of weaving schools, where boys may learn the use of such looms, with a view to their more extended use among the towns and villages of all Provinces in India.

Proposed by Mr. Prabhas C. Mitra (Calcutta).

Seconded by Mr. Babulal Govika (Aligarh).

Supported by Mr. Fazlal Hassain (Aligarh).

IV

Resolved that this Conference urges Indian capitalists to establish at their own cost schools for spinning, dyeing, pottery, carpentry, and the manufacture of ironware and brassware, in order to afford facilities to boys of all castes and classes to learn such useful industries as a means of their livelihood.

Proposed by Rai Bahadur Lala Baij Nath (Allahabad).

Seconded by Pandit Rambhaji Dutt Chowdhri (Lahore).

Supported by Mr. L. R. Das (Calcutta).

Resolved that where it is possible to raise large funds for Industrial education, this Conference recommends the placing of such funds in the hands of trustees with a view to the establishment of Technological Colleges on the most modern methods adopted in Europe, America and Japan for the training of large numbers of students in the various industries which are profitable in India.

Proposed by Sir Bhalchandra Krishna, Kt. (Bombay).

Seconded by Rai Saheb Lala Girdhari Lal (Delhi).

Supported by Mr. Lukhbir Singh (Muzaffarnagar).

VI

Resolved that Provincial Committees be established in Bengal, Bombay, Madras, the United Provinces, the Punjab, and the Central Provinces and Berar consisting of the members named below for giving effect to the above recommendations, generally encouraging industries and making an industrial survey in their several provinces and compiling useful facts and suggestions for submission to the next

Industrial Conference in December 1906. In order to carry out these views each Committee is requested to raise suitable funds, appoint trustees, frame rules for the conduct of business and lay their accounts before the next Industrial Conference.

Resolved that the following gentlemen be the members of the Provincial Committees for the year 1906, with power to add to their number:—

BENGAL.

T. Palit, Esq.
The Honourable Mr. J. Chawdhari.
R. N. Mukerji, Esq.

BOMBAY.

D. E. Wacha, Esq.
The Honourable Mr. Vithaldas D. Thackersey.
Lallubhai Samaldas, Esq.

MADRAS.

N. Subbarao, Esq.
The Honourable Mr. L. A. Govindaraghava Iyer.
V. Krishnaswami Iyer, Esq.

UNITED PROVINCES.

Rai Bahadur Lala Baij Nath.
The Honourable Pandit Madan Mohan Malaviya.
Munshi Ganga Prasad Varma.

THE PUNJAB.

Rai Bahadur Lala Ganga Ram, C. I. E.
Shaikh Umar Baksh.
Lala Harkishenlal.
Lala Lajpat Rai.
Lala Mulkaraj.

CENTRAL PROVINCE AND BERAR.

Rao Bahadur R. N. Mudholkar.
G. S. Khaparde, Esq.
M. V. Joshi, Esq.
Proposed by Lala Lajpat Rai (Lahore).
Seconded by Rai Bahadur Ganga Ram (Lahore).
Supported by the Honourable Mr. L. A. Govindaraghava Iyer (Madras).

VII

Resolved that this Conference appoints Rao Bahadur R. N. Mudholkar as General Secretary, empowers the President to appoint a per-

manent Assistant Secretary and establishment on suitable pay and allots a sum of Rs. 5,000 for meeting the expenses of the next twelve months.

Proposed by the Honourable Pandit Madan Mohan Malaviya (Allahabad).

Seconded by Mr. C. Vijayaraghavachariar (Salem).

BENARES,
30th December, 1905.

}

R. C. DUTT,
President.

R. N. MUDHOLKAR,
General Secretary.

THE INDIAN INDUSTRIAL CONFERENCE.

*Resolutions passed at the Second Indian Industrial Conference
held at Calcutta on the 29th and 31st December 1906.*

I. TECHNICAL AND COMMERCIAL EDUCATION.

RESOLVED—That this Conference re-affirms the Resolutions passed at the Conference of last year on the subject of Technical and Commercial Education, and requests the Government to establish a sufficient number of Secondary Technical and Commercial Schools, a superior Technical College for each Province, and one fully equipped first class College of Technology for all India. And that a Committee consisting of the President, the General Secretary, Messrs R. C. Dutt, D. E. Wacha, G. V. Joshi, G. Subramania Iyer, Lajpat Rai, P. N. Bose, A. C. Sen, Deva Prasad Sarvadhikari, and Dr. Nil Ratan Sircar, be appointed to prepare a Memorial on the above lines for submission to Government by the President and the General Secretary.

Proposed by—V. Krishnaswami Iyer, Esq. (Madras).

Seconded „—Deva Prasad Sarvadhikari, Esq. (Calcutta).

Supported „—Babu Ambica Charan Maitra, (Pabna)

„ „—G. A. Natesan Esq. (Madras).

and carried unanimously.

II THE INDIAN STORES COMMITTEE.

RESOLVED—That this Conference conveys its thanks to the Government of India for appointing a Committee for making recommendations for the use by Government departments of indigenous articles in preference to foreign goods, and requests that they be pleased to direct the early publication of the Report of the Committee, so that the public and the trades in India may have an opportunity of considering it before final orders are passed on the subject.

Proposed by—Sir Bhalchandra Krishna, (Bombay).

Seconded „—K. Natarajan, Esq. (Bombay).

Supported „—Moulvie Muhammad Nizamuddin Hassan (Lucknow),
and carried unanimously.

III INDUSTRIAL SURVEY.

RESOLVED—That in view of the importance of having an Industrial Survey of India made by Government, and having regard to the recommendation made by the Committee on Industrial Education to that effect, this Conference requests Government to make such a survey, and empowers the President and the General Secretary to submit a memorial on the subject.

Proposed by—Rao Bahadur R. N. Mudholkar (Amraoti).

Seconded „—Biprodas Pal Chowdhuri, Esq. (Calcutta).

Supported „—S. C. Mookerjee, Esq. (Calcutta).

and carried unanimously.

IV SUGGESTIONS TO THE PUBLIC.

RESOLVED—That this Conference specially invites the attention of the public to the great importance of introducing the use of improved handlooms among the weavers of India, of promoting technical education by the establishment of schools and classes, and of starting laboratories for the purpose of determining the industrial value of Indian products.

Proposed by—Dewan Bahadur Ambalal S. Desai (Ahmedabad).

Seconded „—Vishwanath P. Vaidya, Esq. (Bombay).

Supported „ Dr. Nil Ratan Sircar (Calcutta)

„ „—Shet Damodardas Khivraj (Beawar).

and carried unanimously.

V. THE CONFERENCE PROVINCIAL COMMITTEES.

RESOLVED—That the Provincial Committees already established be asked besides taking steps to promote industries in their several provinces, to compile useful facts and suggestions for submission to the next Industrial Conference, and to raise suitable funds for carrying on their work.

Proposed by—Dewan Bahadur L. A. Govindaraghava Iyer (Madras).

Seconded „—Babu Ambica Charan Ukil (Calcutta).

Supported „—A. Ramanna Esq. (Mysore).

and carried unanimously.

VI.. APPOINTMENT OF OFFICE-BEARERS AND PROVISION OF FUNDS FOR THE YEAR 1907.

RESOLVED—That this Conference re-appoints Rao Bahadur R. N. Mudholkar as General Secretary and Mr. C. Y. Chintamani as Assistant Secretary, and empowers the President and the General Secretary to appoint an Additional Assistant Secretary and establishment on suitable pay, so that the Assistant Secretary may be free to visit the different provinces and help the Provincial Committees in all matters in which

they may require assistance. And this Conference allots a sum of Rs. 10,000 for meeting the expenses for the next twelve months, and also for issuing a quarterly bulletin of industrial information under suitable management.

Proposed by—R. C. Dutt, Esq., C. I. E., (Baroda).

Seconded „ —Rai Bahadur P. Ananda Charlu, C. I. E., (Madras) and carried unanimously.

VITHALDAS D. THAKERSEY,

President.

R. N. MUDHOLKAR,

General Secretary.

RESOLUTIONS PASSED AT

THE THIRD INDIAN INDUSTRIAL CONFERENCE,

Held at Surat on the 30th December 1907.

I. INDUSTRIAL SURVEY.

Resolved—That this Conference expresses its sense of satisfaction that an Industrial Survey has been carried out in the United Provinces and is being carried out in the Central Provinces and Berar, and in the Baroda State; and it would urge other Provincial Governments in British India and the Governments of other Indian States to carry out at an early date Industrial Surveys of the territories within their jurisdiction, as exact and detailed information would afford facilities for the introduction of a sound system of technical education and the well-ordered development of indigenous industries.

(Proposed by Sir Bhalthandra Krishna, *Kt.*, of Bombay, seconded by K. Natarajan, Esq., of Bombay, and carried unanimously)

II. TECHNICAL AND COMMERCIAL EDUCATION.

Resolved—(a) That this Conference re-affirms the Resolution on Technical and Commercial Education passed at the last Conference.

(b) That this Conference thanks the Government of the United Provinces for the action taken by them with a view to introduce a fairly comprehensive system of Technical Education in those Provinces and would express the hope that other Provincial Governments will be pleased to convene representative conferences such as the recent Naini Tal Conference to devise measures for the spread of Technical Education in their respective provinces. And this Conference further expresses the hope that the Government of India would provide adequate funds for giving effect to the recommendations of the Naini Tal Conference and carrying out similar schemes in other provinces.

(c) That this Conference, while appreciating the action taken by the Governments of some Indian States to encourage Technical Education, urges that further steps should be taken in the same direction in all Indian States.

(d) That this Conference welcomes the growth of public interest in Technical Education as shown by the action taken by certain local and municipal boards and private associations in promoting it, and it strongly urges on the leaders of the people the necessity of taking practical steps for providing increased facilities for it by starting institutions and founding scholarships to encourage technical studies in India and abroad.

(Proposed by R. C. Whitenack, Esq., of Baroda, seconded by D. G. Dalvi, Esq., of Bombay, supported by Ishwar Das Varshini, Esq., of Aligarh and Professor Ruchi Ram Sahni of Lahore, and carried unanimously.)

III. AGRICULTURAL EDUCATION.

Resolved—That this Conference records its sense of appreciation of the action taken and contemplated by the Government in regard to the establishment of Agricultural Colleges in the several provinces, and would urge that in view of the importance of a wider spread among the cultivating and landholding classes of a practical knowledge of the principles of scientific agriculture and modern methods, Government would be pleased to establish Experimental and Demonstration Farms as widely as possible, and to start vernacular schools in connection with them one at least in every district.

(Proposed by G. Subramania Iyer, Esq., of Madras, seconded by Rao Bahadur Khandubhai Gulabbhai Desai of Surat, and carried unanimously.)

IV. AGRICULTURAL BANKS.

Resolved—That this Conference begs to call the attention of Government to the urgent need of promoting the establishment of Agricultural Banks to help co-operative credit societies and to advance loans directly to agriculturists at reasonable rates of interest, and further begs to suggest that the advice and co-operation of representative members of the Indian community may be enlisted in devising a suitable scheme to secure this object.

(Proposed by Rao Bahadur Lalshankar Umiashankar of Ahmedabad, seconded by Thakorram Kapilram, Esq., of Surat, and carried unanimously.)

V. THE MINING INDUSTRY.

Resolved—(a) That this Conference expresses its sense of satisfaction at the successful formation of the Tata Iron and Steel Company, Limited, with the help entirely of capital raised in India.

(b) That this Conference invites the attention of capitalists in India to the urgent need of developing and fully utilising the mineral resources of the country and trusts that in view of the ultimately lucrative character of the industry they will make organised efforts in that direction.

(c) That this Conference is of opinion that special consideration should be shown to Indian enterprise and initiation by the Government and preferential treatment given to it.

(Proposed by Rao Bahadur R. N. Mudholkar, of Amraoti, seconded by the Honourable Mr. Gokuldas K. Parekh, of Bombay, and carried unanimously.)

VI. COTTON SPINNING AND WEAVING.

Resolved—(a) That this Conference records its sense of satisfaction at the stimulus the Spinning and Weaving industries have received from the Swadesi movement and it urges the bestowal of increased attention on Cotton Cultivation, the erection of Spinning and Weaving Mills at suitable centres, and the revival of the Handloom Weaving industry on a commercial basis, as essential to the success of the movement.

(b) That this Conference urges the Government to remove the restrictions retarding the expansion of the industry and to provide facilities for affording practical instruction in weaving by the establishment of Weaving Schools at every important weaving centre.

(Proposed by L. K. Tulasiram Esq., of Madura, seconded by S. B. Sankaram, Esq., of Ellore, and carried unanimously.)

VII. THE SUGAR INDUSTRY.

Resolved—(a) That this conference notices with concern the increase in the imports of foreign sugar, and is of opinion that to arrest the steady decline of the indigenous industry it is absolutely necessary to encourage the cultivation of healthier and more prolific varieties of cane, to employ greater care in cultivation, to use more economical processes for extracting the juice, and, above all, to adopt the most modern and efficient methods of refining.

(b) That this Conference urges the Government to provide more extensive irrigational facilities, to allow the utilisation of bye-products, and, further, to consider the desirability of imposing a duty upon imported sugar in order to protect the indigenous industry.

(Proposed by the Honourable Pandit Madan Mohan Malaviya, of Allahabad, seconded by Manubhai Nandshankar, Esq., of Baroda, supported by Lala Dharamdas Suri of Lahore and Chunilal Vrijbhukan-das, Esq., of Bombay, and carried unanimously.)

VIII. APPOINTMENT OF OFFICE-BEARERS AND PROVISION OF FUNDS FOR THE YEAR 1908.

Resolved—That this Conference re-appoints Rao Bahadur R. N. Mudholkar as General Secretary and Mr. C. Y. Chintamani as Assistant Secretary, and it appeals to the public for a sum of Rs. 10,000 for meeting the expenses for the next twelve months.

Proposed by Sir Bhalchandra Krishna, *Kt.*, of Bombay, seconded by the Honourable Pandit Madan Mohan Malaviya, of Allahabad, and carried unanimously.

<p>Surat, The 30th December 1907.</p>	}	<p>AMBALAL SAKERLAL DESAI, <i>President, The Third Indian Industrial Conference.</i> R. N. MUDHOLKAR, <i>General Secretary, Indian Industrial Conference.</i></p>
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RESOLUTIONS PASSED AT THE FOURTH INDIAN INDUSTRIAL CONFERENCE,

Held at Madras on the 26th and the 27th December 1908.

I.—DEPARTMENTS OF INDUSTRY.

Resolved—(a) That this Conference is of opinion that there should be in every province of British India a Department of Industry under a Director of Industries to deal with industrial questions and to be in charge of technical and commercial education as well as industrial instruction; and that there should be an Advisory Board of qualified persons, not less than one-half of whom should be non-official Indians, who should be consulted on all matters of importance;

(b) that the functions of this Department should include (1) the supply of advice in regard to new industries, (2) the introduction of new or improved methods and processes, (3) the carrying out of investigations and experiments, (4) the development of selected industries, and (5) the organization of Industrial and commercial exhibitions;

(c) that there should be an industrial museum and a bureau of information under the Department of Industry for supply of information to the public on industrial and commercial matters.

[Proposed by D. E. WACHA, Esq (BOMBAY), seconded by RAO BAHADUR G. SRINIVASA RAO (MADURA), supported by R. V. MAHAJANI Esq., (AKOLA), and carried unanimously.]

II.—TECHNICAL AND INDUSTRIAL EDUCATION.

Resolved—That this Conference re-affirms the Resolutions of the previous Conferences on Technical and Industrial Education, and urges (1) that the Victoria Jubilee Technical Institute, Bombay, and the College of Science, Poona, be enlarged so that they may between them supply for the Presidency of Bombay technological instruction in all the branches of mechanical and chemical industries; (2) that the Government of India may sanction the proposal of the Government of Bengal to add classes in Industrial Chemistry to the Sibpur Engineering College; (3) that the Government of Madras will be pleased to give effect to the recommendation of the Ootacamund Industrial Conference that the Madras College of Engineering should be expanded into an Institute of Technology; (4) that the Secretary of State might accord early sanction to the proposal of the Government of the United Pro-

vinces that a College of Technology should be opened at Cawnpore; and (5) that similar institutions should be established in the Punjab, Burma and Eastern Bengal and Assam.

[Proposed by the HON'BLE PANDIT MADAN MOHAN MALAVIYA ALLAHABAD), seconded by the HON'BLE MR. GOKULDAS K. PAREKH (BOMBAY), supported by T. RANGACHARIAR ESQ. (MADRAS) and LALA DHARAM DAS SURI (LAHORE), and carried unanimously.]

III.—COMMERCIAL EDUCATION.

Resolved—(a) That in the opinion of this Conference the time has come for the Indian Universities to create Faculties of Commerce and institute Degrees in Commerce, and to affiliate Commercial Colleges that will prepare candidates for University degrees in Commerce ;

(b) That there should be established one College of Commerce at each Provincial capital and that it should include provision for the training of teachers for Commercial Schools in the mofussil.

[Proposed by K. Subramani Aiyer, Esq. (Bombay), seconded by D. G. Dalvi, Esq. (Bombay), and carried unanimously.]

IV.—AGRICULTURAL BANKS.

Resolved—That this Conference again invites the attention of the Supreme and the Provincial Governments to the urgent need for Agricultural Banks both to assist, co-operative credit societies and, in cases where co-operative credit societies cannot or will not serve, to advance loans directly to agriculturists on easy terms, and urges them to take early action in the desired direction in conjunction with Indian capitalists who, the Conference feels confident, would be ready to co-operate with Government in any such scheme.

[Proposed by Lalubhai Samaldas, Esq. (Bombay), seconded by Rao Bahadur Khandubhai G. Desai (Surat), supported by Rao Bahadur V. K. Ramanujachariar (Kumbakonam), and carried unanimously.]

V.—COTTON EXCISE DUTY.

Resolved—That this Conference records its emphatic protest against the continuance of the excise duty on Indian mill-made cloth as an unjust and unnecessary impost and urges that it should be removed without delay.

[Proposed by Uttamlal K. Trivedi, Esq. (Bombay), seconded by Pandit Rambhuj Dutt Chowdhuri (Lahore), and carried unanimously.]

VI.—RAILWAY RATES ON GOODS.

Resolved—That this Conference calls the attention of the Government to the prevailing complaints about existing railway rates, and suggests that an enquiry should be instituted into their effect on indigenous industries especially in their competition with imported goods, and further submits that the rates should be reduced where their effect may be proved to be injurious.

[Proposed by Dewan Bahadur Ambalal S. Desai (Ahmedabad), seconded by Rao Bahadur Deorao Vinayak (Akola), and carried unanimously.]

VII.—MINING, WEAVING AND SUGAR INDUSTRIES.

Resolved—That while expressing its satisfaction at the steady progress of the Swadeshi movement, this Conference, concurring with the last Conference, calls the particular attention of capitalists and the general public to the necessity of developing the Mining, Weaving and Sugar industries, and urges the formation of Joint-Stock Companies for working mines and erecting mills and factories.

[Proposed by the Hon'ble Sir Vithaldas D. Thackersey, *Kt.* (Bombay), seconded by G. Subramania Iyer, Esq. (Madras), supported by the Hon'ble Mr. H. S. Dikshit (Bombay), and carried unanimously.]

VIII.—OFFICE-BEARERS AND FUNDS FOR NEXT YEAR.

Resolved—That this Conference re-appoints Rao Bahadur R. N. Mudholkar as General Secretary and Mr. C. Y. Chintamani as Assistant Secretary for the year 1909, and appeals to the public for a sum of Rs. 5,000 to meet the expenses for the next twelve months.

[Proposed by N. Subbarao Pantulu, Esq. (Rajahmundry), seconded by Babu Ganga Prasad Varma (Lucknow), and carried unanimously.]

MADRAS,
The 27th December, 1908.

R. N. MUDHOLKAR,
President,
The Fourth Indian Industrial Conference.

APPENDIX V.

LIST OF DELEGATES TO THE FIFTH INDIAN INDUSTRIAL CONFERENCE,

HELD AT LAHORE IN DECEMBER 1909.

1 Elected by the Native Share, Stock Exchange and Bullion Broker's Association, Bombay—

Mr. R. R. Nabar, B.A.

2. By the Mill Owners' Association, Bombay—

Mr. Jehangir Bomanji Petit.

3. By the Indian Merchants' Chamber and Bureau, Bombay—

Mr. Motilal Valabhji.

4. By the Bombay Presidency Association, Bombay—

The Hon'ble Mr. G. K. Parikh, D. E. Wacha, N. M. Samartha.

5. By the Deccan Education Society, Poona—

Prof. V. G. Kale, M.A., Mr. N. A. Dravid, M.A.,

6. By the District Association, Surat—

Rao Bahadur Khandubhai G. Desai.

7. By the Industrial Association, Sholapur—

Mr. P. L. Nagpurkar.

8. By the Mining and Geological Institute, India, Calcutta—

Mr. T. H. D. La Touche, B.A., F.G.S.

9. By the Bengal Technical Institute, Calcutta—

Mr. Surendra Nath Banérjee, Mr. Bhupendra Nath Bose, Mr. Prithwis Chandra Roy, Mr. A. Chowdhuri, Mr. J. Ghosal, Mr. Moulvi Abul Kassim, Mr. Ramani Mohun Das, Mr. K. N. Das Gupta, Mr. Satyananda Bose.

10. By the Punjab Chamber of Commerce.

Mr. C. W. Craig, Mr. J. H. Chase, Rai Sahib Girdhari Lall.

11. By the South Indian Association, Madras—Dewan Bahadur L. A. Govinda Raghava Aiyar, Mr. G. A. Natesan, Mr. P. R. Sundara Aiyar, Mr. N. Subba Rao Pantulu, Mr. P. Lakshmi Narasu Naidu.

12. By the National Fund and Industrial Association—Mr. A. C. Parthasarathy Naidu Garu, Mr. T. V. Gopalaswamy Mudaliar, Pandit D. Gopala Charlu, N. Rama Rau, Mr. C. Gopala Menon, Mr. K. B. Ramanath Ayer.

13. By the Behar Landholder's Association, Bankipore—The Hon'ble Mr. S. Sinha, Hon'ble Mr. Deep Narain Singh, Mr. Syed Hasan Imam, Mr. Mazharul Haque, Moulvi Abdul Rasheed, Babu Moheshwar Prasad, Hon'ble Maharaja of Tikari, Mr. Purmeswar Lal, Moulvi Syed Fukhruddin, Babu Krishna Saha.

14. By the Berar Association, Amraoti—The Hon'ble Rao Bahadur R. N. Mudholkar, Rao Bahadur Deorao Vinayak and R. G. Mundle, Mr. B. R. Landge, Mr. G. N. Kane.

REPORT
ON THE
WORK OF THE
INDIAN INDUSTRIAL
CONFERENCE

INCLUDING A
RECORD OF GENERAL INDUSTRIAL ACTIVITY
IN THE TWELVE MONTHS

(December 1908 to November 1909)

MADRAS : G. C. LOGANADHAM BROS.
THE GUARDIAN PRESS, MOUNT ROAD
1910

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REPORT

OF

Industrial Conference Work and record of

**General Industrial activity in the country in the
twelve months ending with November, 1909.**

PART I

INDUSTRIAL CONFERENCE WORK

December 1908.

1. The report submitted to the Fourth Indian Industrial Conference, which was held at Madras in December 1908, covered the 12 months from December 1907 to November 1908. The work that engaged the conference office in December 1908, was mainly in connection with the last session of the conference. The Assistant Secretary Mr. C. Y. Chintamani spent almost the whole month at Madras in helping the local committee to make the necessary arrangements for holding the conference. The Resolutions to be placed before the conference were settled at a committee meeting and the conference itself was held in the Congress pavillion at Madras on 26th and 27th December 1908, under the presidency of Rao Bahadur R. N. Mudholkar, B.A., L.L.B., Advocate, Amraoti and General Secretary of the Indian Industrial Conference. A full report of the proceedings was issued in the month of October last.

January to November, 1909.

2. By Resolution No. VIII of the last conference Rao Bahadur R. N. Mudholkar and Mr. C. Y. Chintamani were reappointed as General and Assistant Secretary respectively, and an appeal was made to the public for the sum of Rs. 5,000 to meet the expenses of the current year. Out of this sum Rs. 4089-8-0 only have been actually realized. Owing to want of sufficient funds the idea of the appointment of an additional Assistant Secretary as per Resolution No. VI of the conference of 1906, had to be abandoned this year also and the proposal to issue a quarterly Bulletin of Industrial information from the office could also not, be carried out.

3. The assistant Secretary in the course of his tour visited the under mentioned places:—

Calcutta, Allahabad, Lucknow and Agra, in connection with the general work of the conference and also actively assisted the following conferences held at Agra, Bhagalpore and Berhampur (Madras Presidency) respectively.

(1) The third United Provinces Conference.

(2) The Behar Industrial Conference.

(3) The South Indian Industrial Conference.

Mr. Chintamani's account of his tours is as usual appended to this Report.

4. The Resolutions passed at the Fourth Industrial Conference were submitted by the General Secretary to the Government of India and also to the various Provincial Governments.

5. The whole of the third Edition of the Directory of Indian Goods and Industries published

in December 1908 has been sold out. There being a constant demand for this publication from the general public as also from the different Departments of the Governments of the various British Indian Provinces, and of Indian States, a Fourth Edition carefully revised and brought up-to-date has been prepared in the Office. This edition is expected to be ready for issue to the public in the last week of December, as usual.

6. The Directory of Technical Institutions prepared last year in this office was issued this year to the public. It has been very favourably received in all quarters and seems to be appreciated by the Educational and other Departments of the British Government as well as by those of the Indian states. Orders for nearly half the number of copies struck off, were received in advance, and the edition is selling out very rapidly. For this recognition of their work, the office of the Industrial Conference feels greatly indebted, to all who have expressed their appreciation or patronized the publication.

7. During the year under review, Industrial Conferences and Exhibitions, Agricultural and cattle-shows were held in several places. They will be found dealt with separately in Part II under their respective heads. The important event of this kind was the Central Provinces and Berar Exhibition which had been opened on 12th November 1908. It continued to be held during that month and the two following months. The opening ceremony and the main features of the Exhibition were noticed in last year's Report.

8. It is exceedingly gratifying to note that the

proposals of the conference in regard to Industrial Survey and Technical Education are gradually being appreciated and have actually been carried out by more than one Government. Since the meeting of the last Conference the Industrial Survey of the Provinces of Eastern Bengal and Assam, has been completed. The Report, prepared by Mr. G. N. Gupta, M. A., I. C. S., who was specially deputed for the purpose, is fairly exhaustive and deserves to be carefully studied.

The Government of Bombay appointed a special officer Mr. P. N. Mehta to conduct an enquiry into the condition of the Handloom Industry and to make suggestions for placing it on a more advantageous basis. His report is noticed in Part II section A appended to this Report.

9. With the object of giving a practical effect to Resolution No. VI of the Benares Conference which required the Provincial Committees to make an Industrial Survey and compile useful formation ; copies of the printed set of questions to be answered were again sent to the Governments of several Indian States, and to prominent gentlemen of various provinces who take an interest in Industrial matters. The Conference Office is glad to note that in response to this circular letter, the Governments of several Indian States have furnished the information concerning their own territories ; their replies are printed as Appendix.

10. A record of the general industrial activity in the country including an account of the steps taken by the Governments of the British Indian provinces and of the Indian States, has been

compiled from Official and non-official sources and accompanies this Report as Part II, sections A & B.

11. The lists of Indian Patentees and of the new companies registered during the last twelve months are printed as annexures.

In connection with the list of Indian Patentees a few remarks will not be out of place. The number as well as the nature of the inventions for which patents are applied for in a country, represent its general industrial activity as well as the ingenuity of persons engaged therein. Judging by this standard, India presents an exceedingly low percentage in the ratio of inventions to the vast population of the country. This is not to be wondered at as the work of true Industrial Education is but only now taken in hand and the artisan classes are steeped in deep ignorance and are notoriously unwilling to make the slightest change from the old methods handed down to them by their forefathers. Some very interesting details on the subject of patents are given by Mr. H. G. Groves, the head of the patents office in India, in his Presidential address delivered before the Mining and Geological Institute of India, which have appeared in the transactions of that Institute for August 1909. From the figures furnished by him, it would appear that the total number of patents granted in all the countries of the world between 1835 to 1907—a period of about 70 years, is about two millions and seventy five thousand. Out of this the United States of America heads the list with about eight lakhs of inventions, Great Britain and France come next with about three lakhs each and has Germany two lakhs. Mr. Groves has

also pointed out that up to the end of last year namely 1908 only 7387 patent rights have been granted in India on a total number of nine thousand five hundred and ten applications. After omitting the foreign applicants for Indian Patents, the average per year, of Indian Patentees comes only to 250, which gives the ratio of one in six millions. Any comments on this are unnecessary.

12. There are on the legislative anvil two Bills which will have a far reaching effect on the industrial progress of the country and its capability to meet the competition of the highly organised activity of the western countries.

The Indian Factories Bill which is designed to put a stop to certain supposed mal-practices of manufacturers in India (European and Indian) is regarded with suspicion and alarm by almost all interested in factory operations. It involves an amount of interference with adult male labour, with the freedom of contract and with one's power over one's own property, such as is not compatible with the genius of British Jurisprudence and cannot be easily reconciled with the fundamental principles of British Indian polity. There is to be not only, a rigid statutory restriction placed on hours of adult labour though neither the employees nor employers have asked for it and a denial of opportunity to a strong hale man ready and willing to work to add to his slender resources by a little extra work, but a total prohibition for textile factories to work beyond certain hours. The proposed enactment is one which demands the most careful and anxious consideration of the conference, as it is calculated to

strike a blow at the most important and rising manufacturing industry of the country.

The other proposal relates the amendment of the Indian Companies Act, and is likely to be of a different character. All the same it will demand close scrutiny, as unsuitable imitations of foreign measures even when effected with good motives, are apt to prove as injurious as laws radically vicious and unsound.

13. The Indian Industrial Conference has lately been described by a leading Anglo-Vernacular paper of the Bombay Presidency, as a Bureau of Industrial Inquiries established by the Nation, and working on National lines. Since its formation, the office of the Industrial Conference has been conscientiously and honestly endeavouring to fulfil this expectation of the Nation by compiling and disseminating information on existing industries, in all the parts of India, by suggesting new lines of industrial enterprise, which await development at the hands of capitalists and the educated classes in India, by stimulating local bodies and Departments of British Governments and Indian States to undertake Industrial Surveys, promote Technical Education, by founding Industrial and Technical Schools and Colleges and awarding Scholarships for study in Foreign countries and by answering inquiries on industrial matters and in various other ways.

14. With a view to carry out on a larger scale and in more directions this object of the Indian Industrial Conference, the President and the General Secretary were empowered by Resolution VI passed

at the Calcutta Conference of 1906, to entertain an additional Assistant Secretary to visit the different provinces, to revive or organise local committees therein, to stimulate local activity by public lectures, expounding the aims and objects of the Conference and by appeals to the educated and commercial classes to enlist their co-operation in the industrial regeneration of the country.

It was also the great desire of the General Secretary to open an Industrial and Commercial Intelligence Branch in the office of the Conference, on lines similar to those of the branch attached to the Board of Trade, London, and the Bureau of Industrial inquiries established by the Department of Industries and Commerce of the Government of India. It is a matter of great regret that no action could be taken in these directions through want of funds. Numerous inquiries are addressed to the Secretary and his advice is often sought about the practicability or mode of starting particular industries. Such response as was possible or within his knowledge, was given by him. But none can feel more acutely than he does of the inadequacy of very many of those replies, for want of a suitable staff to collect and collaborate all the available information. It rests with the supporters of the conference and the general public to put him in a better position to carry out more efficiently and satisfactorily this important work.

Funds are wanted for the purpose of entertaining two more full time qualified men to purchase numerous official and non-official publications issued in India, Europe and America and for making the

information gleaned from these sources, available to the general public. To take only one instance the Secretary is often asked whether a particular kind of industry can be established in a particular locality, what machinery is needed for it, the capital required for conducting it in a sound manner, the firms from which the requisite machinery should be obtained and so on. At times, he is asked to advise how a particular industry can be carried on within a certain sum named. It is very necessary in the present condition of our country that sound and reliable advice on such matters should be forthcoming and so far as his limited knowledge and experience went the General Secretary gave the best advice he could. Very often he referred the inquirers to more qualified persons. At times he had to say he could give no advice. It is eminently desirable—it ought to be said necessary that he should be enabled to offer fuller and more accurate information and more certain guidance.

15. I beg to repeat my acknowledgments to the Supreme and Provincial Governments, and the Managers of the Newspapers and other periodicals who have been kindly supplying the conference office with their Reports, Gazettes, Journals and Newspapers free of cost.

16. I wish to place on record my sincere appreciation of the extremely valuable assistance rendered to me by Mr. C. Y. Chintamani during the period he was attached to this office since 1906. The success achieved by the Indian Industrial Conference within the short period of its existence till now was in no small measure due to his devotion,

zeal and energy. He has resigned his place as paid Assistant Secretary as he has taken up the editorship of a daily journal—The Leader—at Allahabad. His interest in industrial matters is, however, unabated and he has promised to continue his connection as an Honorary co-adjutor after he has completed the difficult organising work of the new venture undertaken by him.

17. Mr. K. V. Jamkhandikar who has been working as Sub-Assistant Secretary and on whom the brunt of office work has fallen has also resigned as he has obtained a more lucrative post elsewhere. He has served the Conference zealously and conscientiously.

18. Mr. M. B. Sant, whose interest in the cause of Industrial activity in the country was noticed on two previous occasions, has been appointed Assistant Secretary in succession to Mr. Chintamani. I expect much useful and practical work from him.

19. Statements of receipts and disbursements of the office of the General Secretary are published with this Report.

		R. N. MUDHOLKAR,
		<i>President,</i>
		<i>Fourth Indian Industrial</i>
		<i>Conference</i>
		<i>and</i>
		<i>General Secretary,</i>
		<i>Indian Industrial Conference.</i>
AMRAOTI,	}	
December, 1909.		

Summary of Accounts of the Indian Industrial Conference for the month of December 1908.

Receipts.		Amount.		Disbursements.		Amount.	
		Rs.	A.P.			Rs.	A.P.
Balance at the end of November 1908	...	2,221	15 9	On "Directory of Indian Goods and Indus-	...		
Donation (balance) by Lalubhai Samaldas	...	75	0 0	tries" Account	...	564	14 4
Donation by the Honourable Pandit Madan	...	50	0 0	Do. Printing Annual Report of the Office of	...		
Mohan Malaviya, Allahabad	...	50	0 0	the Industrial Conference and Record of	...		
Do. Dewan Bahadur L. A. Govindaraghava	...	50	0 0	General Activity in the country	...	61	14 8
Iyer, Madras	...	50	0 0	Pay of Assistant Secretary and other establish-	...		
Do. S. Sinha, Esq., Bankipore	...	50	0 0	ment charges	...	204	0 0
Do. Markand Nandshankar Mehta, Esq.,	...	25	0 0	Travelling expenses of the Assistant Secretary.	...	69	9 6
Bombay	...			Postage	...	15	1 0
Do (balance) Ganga Prasad Varma, Esq.,	...	10	0 0	Telegrams	...	21	1 0
Lucknow	...			...	...	23	14 0
On "Directory of Indian Goods and Indus-	...	188	0 0	Railway freight and cartage	...	4	13 0
tries" Account	...			Furniture	...	1	10 0
Do. "Directory of Technical Institutes in	...			Sundries	...		
India " Account	...	10	0 0		...		
Do. "Report of the Second Indian Indus-	...	11	0 0		...	966	13 6
trial Conference " Account	...	20	13 0	Balance	...	1,744	15 3
Do. " Third do. Account	...				...
Grand Total	...	2,711	12 9	Grand Total	...	2,711	12 9

" AMRATHI }
 1st January 1909. }
 R. N. MUDHOLKAR,
 General Secretary,
 Indian Industrial Conference.

Summary of Accounts of the Office of the Indian January to

Receipts.	Amount.
	Rs. A. P.
Opening Balance	1,744 15 8
On " Directory of Indian Goods and Industries " Ac- count	1,197 11 6
On " Directory of " Technical Institutions in India " Account	213 9 6
From sales of Surat Industrial Conference Reports ...	424 1 3
Do do Calcutta do do ...	347 11 0
Do do Madras do do ...	34 8 2
Do do Benares do do ...	1 0 0
Refunds on account of the Reports of the work of the Indian Industrial Conference	68 10 10
<i>Donations :—</i>	
The Hon'ble Sir Vithaldas Damodher Thackersey, Kt., Bombay	200 0 0
The Hon'ble V. Krishnaswami Iyer, Madras ...	200 0 0
Rao Bahadur R. N. Mudholkar, Amraoti ...	200 0 0
A. Chaudhuri, Esq., Bar-at-Law, Calcutta ..	200 0 0
Lalubhai Samaldas, Esq., Bombay ...	150 0 0
Dewan Bahadur Ambalal S. Desai & Sons, Ahmeda- bad	120 0 0
The Hon'ble Mr. P. S. Sivaswami Iyer, Madras ...	100 0 0
S. Srinivasa Iyengar, Madras	100 0 0
P. R. Sundara Iyer Esq., Madras	100 0 0
R. Ramachandra Rao, Esq., Madras	100 0 0
R. N. Mookerjee, Esq., Calcutta	100 0 0
The Hon'ble Mr. Harkishen Lal, Lahore	100 0 0
Sir Bhalchandra Krishna, Kt., Bombay	100 0 0
The Hon'ble Rai Bahadur Pandit Sundar Lal, C. I. E. Allahabad	100 0 0
Dr. Harold H. Mann, Poona	100 0 0
M. V. Joshi, Esq., Amraoti	100 0 0
The Hon'ble Mr. Gokuldas K. Parekh, Bombay ...	100 0 0
Messrs. Morarjee Gokuldas & Co., Bombay ...	100 0 0
R. C. Dutt, E-q., C. I. E. Baroda	100 0 0
Krishna Mills, Beawar (Thakurdas Khivraj, Esq.,) N. Subba Rao, Esq., Rajamundry	50 0 0
The Hon'ble Mr. H. S. Dikshit, Bombay	50 0 0
Pandit Motilal Nehru, Allahabad	50 0 0
Dr. Tej Bahadur Sapru, Allahabad	50 0 0
S. N. Pandit Esq., Rajkote	50 0 0
Maharaja Manindra Chandra Nandi, Cossimbazaar ...	50 0 0
Raja Prithvipal Singh, Bara Banki	50 0 0
Hansraj Pragji Thakersey, Esq., Bombay	50 0 0

* Rs. 60 of this for the Permanent Fund.

**Industrial Conference for the eleven Months
November 1909.**

Receipts.				Amount.	
				Rs.	A. P.
Brought forward ...					
Damodar Ramji, Esq., Bombay	...	...	...	50	0
Rao Bahadur Deorao Vinayak, Akola	...	...	...	50	0 0
Rao Bahadur Rajaram S. Dikshit, Nagpur	...	...	...	*30	0 0
C. Y. Chintamani, Esq., Allahabad	...	...	...	30	0 0
Ganga Prasad Varma, Esq., Lucknow	...	...	...	25	0 0
Pandit D. Gopalachari, Madras	...	...	...	25	0 0
Vidya Sagar Pandya, Esq., Madras	...	...	...	25	0 0
D. E. Wacha, Esq., Bombay	...	...	...	25	0 0
Rao Bahadur V. K. Ramanujachari, Kumbakonam	...	...	...	25	0 0
Rao Bahadur K. G. Desai, Surat	...	...	...	25	0 0
K. Perraju, Esq., Cocanada	...	...	...	25	0 0
Shankar Prashad Harprashad Desai, Esq., Bhowanagar	...	...	...	25	0 0
T. Rangachari, Esq., Madras	...	...	...	25	0 0
N. M. Bedarkar, Esq., Amraoti	...	...	...	25	0 0
R. V. Mahajani, Esq., Akola	...	...	...	25	0 0
T. V. Sanjiva Rao, Esq., Coimbatore	...	...	...	25	0 0
Rao Bahadur B. N. Sarma, Vizagapatam	...	...	...	25	0 0
T. V. Seshagiri Iyer, Madras	...	...	...	25	0 0
Mathuradas Ramchand and Hiranand Khemsing Hyderabad (Sind)	...	...	...	25	0 0
T. A. Narsimha Chari, Esq., Salem	...	...	...	†25	0 0
C. M. Gandhi, Esq., Surat	...	...	...	25	0 0
Rao Bahadur M. Adinarayana Iyah, Madras	...	...	...	25	0 0
Rao Bahadur R. G. Mundle, Yeotmal	...	...	...	25	0 0
Harchandrai Vishindas, Esq., Karachi	...	...	...	20	0 0
V. H. R. Ramlingam, Esq., Tirupur	...	...	...	20	0 0
Sarat Chandra Chaudhuri, Esq., Allahabad	...	...	...	20	0 0
V. V. Srinivasa Iyengar, Esq., Madras	...	...	...	20	0 0
V. Ramesam, Esq., Madras	...	...	...	20	0 0
V. G. Mote, Esq., Amraoti	...	...	...	20	0 0
A. S. Balasubramania Aiyar, Esq., Madras	...	...	...	15	0 0
C. R. Tiruvengkatachariar, Esq., Madras	...	...	...	15	0 0
Babu Iswarasaran, Allahabad	...	...	...	15	0 0
Rai Braj Narayan Gurta	...	...	...	15	0 0
Hon'ble Mr Krishnan Nair, Calicut	...	...	...	15	0 0
Manohar Lal Zutshi, Esq., Allahabad	...	...	...	15	0 0
Dr. W. R. Bhat, Amraoti	...	...	...	15	0 0
Rao Sahib N. Subba Rao, Mangalore	...	...	...	10	0 0
N. Krishnaswami Iyengar, Esq., Kumbakonam	...	...	...	10	0 0
Krishna Rao, Esq., Cuddalore	...	...	...	10	0 0
M. Venkatarama Iyengar, Esq., Madras	...	...	...	10	0 0
P. V. Vasudeo Rao, Esq., Madras	...	...	...	10	0 0
Ch. Venkatachalam, Esq., Rajahmundry	...	...	...	10	0 0
Pandit Gokaran Nath Misra	...	...	...	10	0 0

* Rs 15 for Permanent Fund.

† Permanent Fund.

**Summary of Accounts of the Office of the Indian
January to**

Receipts.			Amount.		
			Rs.	A.	P.
	Brought forward	...			
A. P. Sen, Esq., Lucknow	...	...	10	0	0
Pandit Baldeoram Dave, Allahabad	...	...	10	0	0
Pandit Mohan Lal Nehru, Allahabad	...	...	10	0	0
Dr. Suresh Chandra Banerjea, Allahabad	...	...	10	0	0
G. A. Natesan, Esq., Madras	...	...	10	0	0
D. G. Dalvi, Esq., Bombay	...	...	10	0	0
Dewan Bahadur Raja Ratna Mudaliar, Madras	...	...	10	0	0
Keshavlal Amthalal Shaha, Esq., Ahmedabad	...	...	10	0	0
Ajodhya Das, Esq., Gorakhpur	...	...	10	0	0
D. Srirama Sastri, Esq., Vizagapatam	...	...	10	0	0
D. Lakshmanamurti, Esq., Vizagapatam	...	...	10	0	0
Dharamdas Suri, Esq., Lahore	...	...	10	0	0
B. R. Angal, Esq., Amraoti	...	...	10	0	0
Brahmananda Sinha, Esq., Lucknow	...	...	10	0	0
V. Jagannadham, Esq., Vizagapatam	...	...	10	0	0
Babu Siva Mohan Lal, Benares	...	...	6	0	0
P. Lakshmi Narsu Naidu, Esq., Madras	...	...	5	0	0
Srinivasa Iyer, Esq., Coimbatore	...	...	5	0	0
K. R. Venkatarama Iyer, Esq., Tuticorin	...	...	5	0	0
Dr. C. B. Rama Rao, Madras	...	...	5	0	0
K. R. Venkatarama Sastri, Esq.	...	...	5	0	0
S. Narasinga Rao, Esq., Chodavaram	...	...	5	0	0
S. Subba Rao, Esq., Chodavaram	...	...	5	0	0
E. Bhagiratha Rao, Esq., Chodavaram	...	...	5	0	0
P. L. Narasimham, Esq., Vizagapatam	...	...	5	0	0
Lala Manohar Lal, Agra	...	...	5	0	0
Babu Ram Nath Bhargaoon, Allahabad	...	...	5	0	0
Dr. Ranjit Singh, Allahabad	...	...	5	0	0
Dewan Bahadur K. Krishnaswami Rao, Madras	...	...	5	0	0
Ramakant Malaviya, Esq., Allahabad	...	...	5	0	0
P. Nagaphushanani, Esq., Madras	...	...	5	0	0
S. B. Tambe, Esq.	...	...	5	0	0
K. V. Krishnaswami Iyengar, Coimbatore	...	...	5	0	0
G. Subramania Aiyar, Esq., Madras	...	...	5	0	0
Babu Joogal Kishore, Benares	...	...	5	0	0
A Friend	...	...	2	0	0
S. V. Narasimha Pantulu, Esq., Rajam	...	...	4	0	0
P. Surya Narayana Rao, Esq., Rajam	...	...	3	0	0
Purshottam Das, Tandani Esq., Allahabad	...	...	2	0	0
K. Narasimhu, Esq., Cuddalore	...	...	2	0	0
G. R. Kshirsagar, Esq., Amraoti	...	...	2	0	0
Collections in the Pandal	...	...	23	8	0
Total Receipts	...	...	8,121	11	0

**Industrial Conference for the eleven months
November 1909.**

Disbursements,				Amount.	
				Rs.	A. P.
Pay of the Assistant Secretary and other Establishment ...				2,092	7 5
On "Directory of Indian Goods and Industries" Account.				695	2 0
On "Directory of Technical Institutions in India" Account.				635	5 0
On Report of the Surat Industrial Conference Account ...				30	12 0
Do.	Calcutta	do.	do.	61	12 0
Do.	Madras	do.	do.		
On printing of the Report on the work of the Indian Industrial Conference including Record of General industrial activity in the country for the year ending with November 1908.				78	4 0
Travelling expenses of the Assistant Secretary ...				428	0 3
Printing (Miscellaneous)				19	4 0
Postage				112	9 0
Telegrams				34	11 0
Stationery				32	10 6
Books and Periodicals				65	14 0
Binding				27	4 0
Ry Freight				2	10 0
Furniture				7	4 0
Sundries				12	0 0
Expenditure ...				4,354	13 2
Balance ...				*3,766	14 7
Total ...				8,121	11 9
* Out of this balance the following charges have still to be paid :-					
Approximate printing charges of the 4th edition of the "Directory of Indian Goods and Industries"				Rs. 600	0 0
Cost of printing Annual Report of the work of the Indian Industrial Conference				100	0 0
Total ..				700	0 0
Net balance at the end of November 1909. ..				3,066	14 7
Total ..				3,766	14 7

AMRAOTI,

R. N. MUDHOLKAR,
General Secretary

REPORT OF THE ASSISTANT SECRETARY.

The Fourth Indian Industrial Conference which was held at Madras in December 1908 did me the honour of re-appointing me as Assistant Secretary.

2. I visited Calcutta in February and took steps for the reconstitution of the Bengal Provincial Committee of the Conference. A meeting was held for the purpose with Mr. A. Chaudhuri in the chair and Mr. Saroda Charan Mittra was elected President and Messrs. J. Chaudhuri and P. Roy Chaudhuri, Secretaries of the Committee. It is a pity that the Second Bengal Industrial Conference, which was to be held at Hooghly under the presidency of Mr. Saroda Charan Mittra in September last, was put off at the last moment.

3. When I was at Allahabad in the same month the United Provinces Industrial Association, the Committee of which is the United Provinces Committee of the Indian Industrial Conference, was reconstituted with Dr. Satish Chandra Banerjee as President and Babus Purushottam Das Tandon and Parameshwari Dayal as Secretary and Assistant Secretary respectively. Similarly at Lucknow in the same month the Oudh Industrial Association—the Committee of which again acts as the Oudh Committee of the Conference—was reconstituted with Rajah Rampal Singh, C. I.E., of Kori-Sidhanti as President and Rajah Prithipal Singh and Munshi Ganga Prasad Varma as Vice-Presidents. If I may say so, Rajah Rampal Singh is one of the most enlightened and respected Zemindars in the province, and Rajah Prithipal Singh a public spirited young Zemindar of rich promise. When at Lucknow I delivered two speeches, one on "Education and Industrial Development" at the request of the Canning College Students' Association and the other on "The Swadeshi Movement : the work before us" under the auspices of the Oudh Industrial Association.

4. I attended the Third United Provinces Industrial Conference at Agra on April and took part in its deliberations. It was presided over by Mr. Abdulla Khan Yusuf Ali, I. C. S. Deputy Commissioner of Sultanpur, and among those who attended was Professor T. C. Badley, Director of the Department of Commercial Education, Reid, Christian

College, Lucknow, who read an informing and instructive paper on Commercial Education in the United Provinces." The subjects discussed at the Conference included Government action in the matter of industrial development generally and technical education in particular, the co-operative credit movement, railway rates on goods, and the formation of joint stock companies for the development of industries, special mention being made of the sugar industry. An exhibition of the arts and industries of the Agra district was got up in connection with the Conference, and though this was done at a comparatively short notice it was an interesting and a representative collection which was very pleasing to witness. Dealers in Agra-made wares did good business at the sale stalls attached to the Exhibition. The opening ceremony of the Exhibition, it may be added, was performed by Rao Bahadur Lala Baij Nath, a name that needs no introduction to people associated with the Industrial Conference.

5. I was pressed to attend the Second Behar Industrial Conference which was held at Bhagalpore with Kumar Krityananda Sinha of Banuli as President, but had to deny myself the pleasure of accepting the kind invitation as it was held at the same time as the Agra Conference. I regretted this the more as I had the honour of assisting at the inauguration of the Conference last year at Bankipore. It is encouraging to know that the Behar Industrial and Educational Association is doing good work.

6. I went to the Madras Presidency again in the beginning of June to attend the Third South Indian Industrial Conference which was held at Berhampore on the 16th idem with Mr. K. Perraju as President. The Conference was attended by Mr. C. W. E. Cotton, I. C. S., Acting Director of Industries in the Presidency, who addressed it on the steps taken or under contemplation by the Local Government to give effect to the recommendations of the *quasi* official Industrial Conference which met at Madras in September of last year under the auspices of the Government. The Principal resolution of the Berhampore Conference dealt with the same subject.

7. My official connection with the Conference as its Assistant Secretary virtually came to an end at the end of September when I took leave for the remainder of the year. My appointment has been an year to year one as it is made by the Conference as its annual session. Having accepted another engagement, I shall not be in a position to be re-appointed at the forthcoming meeting at Lahore. It is my duty accordingly—and a most pleasant and grateful one it is—to tender my sincere thanks to Rao Bahadur R. N. Mudholkar, General Secretary of the Conference under whom I worked for three years and eight months and from whom I received much consideration and kindness, as well as to the ex-presidents and other prominent members of the Conference who have invariably treated me almost with the courtsey due to a colleague. And writing on the morrow of the lamented death of the first president Mr. R. C. Dutt, I cannot omit to recall with gratitude that it was he who appointed me in the first instance as Assistant Secretary and further to beg leave to place on record my humble sense of the obligation which the Conference is under to him for having at the very first session made arrangements to place the organisation on a firm footing by the establishment of an office with a whole time Assistant Secretary working under the Honorary General Secretary. Throughout the year of his Presidentship he took a deep interest in the affairs of the Conference and not only found funds for it but gave his time ungrudgingly to it whenever called to do so. The death of Mr. Dutt must be reckoned a great loss to the Conference. Once more I beg to thank Mr. Mudholkar for his kindness to me, and to pray or fully wish for continued increasing success to the Conference.

ALLAHABAD,)
The 1st December, 1909.)

C. Y. CHINTAMANI.

PART II

A BRIEF ACCOUNT OF INDUSTRIAL ACTIVITY IN INDIA, DURING THE TWELVE MONTHS

December 1908 to November 1909.

Section A.

*The Governments of British India and Indian States,
and Industrial development.*

As was done in previous years, an attempt will be made to give in this section an enumeration of the measures, acts and orders of the Governments of British India and of the Indian States in reference to the Industrial movement.

BRITISH INDIA.

GENERAL.

1. An important Resolution has been issued by the Government of India during the year under review in connection with the purchase of stores for the use of Government Departments in India. It marks a distinct advance made by Government in their policy towards indigenous manufactures and will be welcomed not only by the people of this country but by all well-wishers of the present movement for the revival of Indian arts and industries.

2. By Resolution No. 1243-1252, dated 19th February 1906, a Committee was appointed by the Government of India to inquire into the procedure in vogue for the purchase of stores for use of Government Departments in India, and to report on the defects in the system adopted by various Local Governments in this matter, more especially with reference to the question of facilitating

purchases of local manufactures and of affording encouragement to local industries. The report of the Committee has not been allowed to be published. But from what is stated in the Resolution of the Government of India it is evident that the Committee had the fairness and fearlessness to point out that in the previous instructions issued by Government from time to time—

(1) There was no indication of the declared policy *in favour* of the purchase of articles of local manufacture.

(2) That the rules on the subject were cast in a permissive form, as they did not require that *preference* should be given to locally produced stores.

(3) That practical difficulty was experienced in carrying out the provision that a comparison should be made between locally made articles and those obtained from England in respect of price and quality.

(4) That there was also the difficulty in regard to the interpretation to be put on the condition that “an article made in India, from imported materials must not have been imported into India, in a finished or partly finished state.”

As a result of these defects in the previous rulings on this subject, it was found that large orders were sometimes sent to England for articles which could have been purchased of local manufacture.

3. To remedy these and other defects, the Secretary of State has now promulgated certain rules, which are more definite and distinctly in favour of Indian manufactures.

Rule 1 provides that all articles produced in India in the form of raw-materials, or manufactured in India from materials produced in India, should *by preference be purchased locally*, provided that the quality is sufficiently good for the purpose and the price is not unfavourable.

Rule 2 provides that all articles manufactured in India

from imported materials should *by preference* be purchased in India, subject to the following conditions :—

(a) that a substantial part of the process of manufacture of the articles purchased has been performed in India ;

(b) that the price is as low as that of similar supplies obtained through the India Office ;

(c) that the materials employed are subjected to the inspection and tests prescribed by the Government of India.

Rule 3 provides that “ Articles which are not manufactured in India should be obtained by indent upon the Store Department of the India Office, except in the following cases :—(a) When the articles are already in India at the time of order and the cost of the supply does not exceed the limits prescribed in Rule 13 (b). In the case of important construction works let out on contract, articles not manufactured in India required for the construction of such work may be supplied by the contracting firm, subject to the following conditions :—(i) That the firm is approved by the Government of India and is included in the lists of firms so approved. (ii) That the materials are subject to the current specifications and tests prescribed by the Government of India.”

It is to be hoped that these rules will be loyally carried out.

4. With a view to facilitate the application of these rules, the Government of India have directed that the Director-General of Commercial Intelligence should compile Quarterly Rate Lists giving comparative costs of articles of Indian make and imported articles *delivered* in India. The existing Rate Lists should be amplified and extended to cover the transactions of all the consuming departments and should give detailed information as to all the charges which imported articles have to bear including the incidence on account of the maintenance cost of the Store Department. The Director-General is entrusted

with the duty of placing the consuming Departments in possession of information as to the resources of Indian manufacturers, and as to the possibility of obtaining from them an indigenous article in substitution for an imported one.

5. The acting Imperial Forest Chemist has invented a process by which the manufacturer will be able to produce as much pure lac as he pleases. This invention has dispensed with the tedious old washing process and can convert the crudest lac into purest shallac at a less cost of manufacture. The samples of the new lac have been sent for valuation to the United States of America, through the Consul General in Calcutta. This lac is reported to be free from the dye and yet retains all its other qualities.

6. The following list gives the names of the candidates selected by the Government of India for scholarships for Industrial Education in Europe.

BOMBAY.

R. V. Gurjar, for processes of bleaching, dyeing and printing in mills.

B. B. Pradhan, for Electrical and Mechanical Engineering.

BENGAL.

Manmath Nath Bysak, for textile chemistry with special reference to dyeing, bleaching and printing of fabrics.

PUNJAB.

M. Nawab-ud-din, for Tanning Industry.

BURMA.

Maung Po Thein, for Mining Engineering.

EASTERN BENGAL & ASSAM.

Mr. Girish Chandra Bardali, for Mining Engineering.

CENTRAL PROVINCES.

Saiyid Faiz-ud-din, for leather tanning.

7. The organization of the Indian Institute of Science, the existence of which is due to the princely generosity and far-sighted and enlightened patriotism of the late Mr. Jamsetji Nasarwanji Tata, has made further progress during the twelve months under report and has, in regard to administrative machinery, approached the stage of completion. In May last, the Government of India announced their decision as to the administrative arrangements necessary for establishing and conducting the Institute. Instead of providing for this by special legislation, as was at one time assumed to be necessary, the Government have taken action under the Charitable Endowments Act 1890 (VI of 1890); and by a vesting order issued under sections 4 and 7 the property given by Mr. Tata, that promised by the Government of Mysore and the donations and annual grants, promised by that Government and the Government of India, are vested in the Treasurer of Charitable Endowments Bombay to be applied to the purposes of the Institute as directed in the scheme settled upon by the latter Government. His Excellency the Viceroy will be ex-officio Patron and the heads of the local Governments will be Vice-Patrons. For administrative purposes, there will be a Court of Visitors, a council of 12, a Senate and a Standing Committee of the Court of Visitors. The council will be the executive body of the Institute. The Institute has now (1) the property given by the late Mr. Tata which yields clear annual income of 125000, (2) land near Bangalore measuring 372 acres given by the Government of H.H. the Maharajah of Mysore, (3) five lakhs of rupees also by the said Government, and two lakhs and a half by the Government of India, from Bombay Revenues and one lakh and a half from the revenues of the Government of Madras for initial expenditure, (4) a permanent grant of Rs. 50,000 a year by the Mysore Government and an annual grant not exceeding one lakh and a half by the Bombay Government equivalent to one half of the income of the Institute from "local

assets," (5) and over half a lakh which Sir Dorab J. Tata and Mr. R. J. Tata have added to the princely endowment made by their noble father.

The academic organization of the Institute has been worked out involving the establishment of six departments in pure and applied science ; the professors of Electrotechnics and Applied Chemistry have been selected with the assistance of a Committee of the Royal Society, and have begun to organize their departments ; plans of the buildings have been drawn up, and work has commenced on the foundations, the water supply and drainage, and the line supplying electric power from Bangalore.

8. Mr. Sindall, a paper expert specially sent out from England is investigating the possibilities of making wood pulp from the Himalayan Silver Fir and Spruce. This question is engaging the attention of the Governments of the United Provinces and Punjab and experimental plants, will shortly be erected in one of these Provinces to test the commercial prospects of the chemical pulp.

9. A series of Indian Pottery clays were analysed and examined by the scientific and technical departments of the Imperial Institute of London and a detailed report of the results of Pottery trials &c has, it is reported, been sent out to the Government of India.

10. It appears from the general report of the Geological Survey of India for 1908, that about 7 Indian graduates are undergoing practical training under expert European officers of the department. About 60 senior students of the Presidency College, Calcutta, were also permitted to work in the Museum for practical training in Geology. This is indeed as it should be. Up to this time, it was a general charge levelled at the authorities concerned that Museums in India are simply something like show rooms, and no help is derived from them for practical research.

11. Very exhaustive statistics have been prepared and published by Mr. Leigh Fermour of the Geological

Survey of India with regard to the localities of Manganese ore in the different parts of India with the total output of each mine, up to the year 1907. India, Russia, Brazil, and Spain, are the principal countries in the world where this ore is found. The Manganese Industry of India has expanded in recent years beyond expectation. In 1906 the total production of India was 571,495 tons and in 1907, 850,000 tons. In 1905 India took the second place amongst the world's Manganese ore producers and in 1906 it occupied the first place. The total exports from India up to 1907 of this valuable ore may be estimated at 2,776,935 tons which is the highest quantity. Had this enormous mass of raw material been worked in this country itself, it would have produced Steel and other bye products worth crores of Rupees. We hope that the managers of the Tata Iron and Steel Co. will be able to utilize future outputs of this extremely valuable ore, which a bountiful Providence has scattered in abundance all over India.

It is a matter of some consolation that mining rights of this ore have been granted to some firms managed and financed by Indian merchants.

BOMBAY.

12. The Bombay Government has sanctioned provisional rules for a normal class to train teachers of handicraft, which is a step in the right direction and calculated to further the cause of Technical Education. This class is attached to the College of Science, Poona, and will be composed of 6 students who have successfully passed through a 3 years' course of Mechanical and Electrical Engineering at the college of science workshops. The subjects of instruction will be :—

- (1) Pattern and cabinet making.
- (2) Ornamental work in wrought iron.
- (3) Cast iron, brass and tin work.
- (4) Tending and testing oil and steam engines and boilers.

- (5) Carpentry.
- (6) Freehand drawing according to the requirements of the School of Art.
- (7) Methods of teaching.
- (8) Practice in taking workshop classes in practical subjects.

Those who pass the final examination at the end of the year will be required to serve for one year in a Bombay workshop approved by the Director of Public Instruction.

Considering that the art of teaching is quite distinct from mere theoretical knowledge and that many persons otherwise capable prove failures as good teachers, the action of the Bombay Government is eminently practical and will, it is hoped, pave the way to popularize and expand Technical Education in the Presidency.

13. In the last year's report allusion was made to the steps that were taken by the Bombay Government at the suggestion of this Conference to institute a survey of the Weaving Industry of the Presidency. Mr. P.N. Mehta, a recent holder of a Government of India scholarship for study of Textile Industry in England, who was appointed to conduct the survey, has completed his inquiry. The report submitted by Mr. P. N. Mehta and the resolution of the Local Government No. 4710, General Department, Bombay Castle dated 7th September 1909, are reproduced as Appendix No. 1.

The following is a summary of Mr. Mehta's report :

- (1) The chief defects of the present system are—
 - (a) Slow and costly preparation of warp.
 - (b) Slow and wasteful methods of stretching the warp on the loom.
 - (c) The primitive type of the looms employed at present by the weavers.
 - (d) The uncommercial method adopted in buying yarns and selling the woven fabric.

(2) The adoption of an improved loom must necessarily be preceded by an improved supply of warp.

(3) There is not yet in the market an improved loom suited to the requirements of the majority of weavers in the Presidency.

(4) The outturn of the present old fashioned loom can be increased 20 per cent. by the supply of well-made warps on a beam.

(5) The supply of warp beams requires the use of winding and warping machines and a beaming apparatus.

(6) One cannot by himself afford to use these machines for the preparation of his own warp, as they involve the investment of capital and production of warp far in excess of the requirements of his individual use.

(7) On an average 75 per cent. of the weavers in the Presidency are in debt to the merchants who supply yarn and take in exchange the finished product of the looms.

To remedy these evils and to afford some substantial help to the weaving classes, the Resolution stated that H. E. the Governor of Bombay proposed as a first step to appoint an assistant to the Registrar of Co-operative Credit Societies, whose function it will be to create similar societies among the hand weavers and to adopt improved methods of production of hand-made cloth.

It is a matter of satisfaction that as promised in the Resolution, such societies have now been formed at Sholapur, Ratnagiri, and other centres.

14. The Secretary of State has sanctioned the appointment of an Instructor in the Textile work in the Bombay Presidency on a salary of Rs. 1,250.

15. The Bombay Government is, it is reported, contemplating the appointment of an expert to inquire into the possibility of development of the industry of canning provisions on the lines of Europeans methods.

16. An Agricultural Conference was held at Poona in October under the Presidentship of the Hon'ble Sir John Muir-Mackenzie. There were a number of papers

read followed by useful discussion. In addition to the papers and discussion, the members had an excellent opportunity afforded to them to see the Experimental and Demonstration farms near Poona conducted by the Agricultural Department and to see there, at work modern agricultural implements and machines and to note the advantages of selection of seeds and use of manures. The Deccan Agricultural Association started last year was placed this year on a more systematic basis—rules and regulations having been framed for it.

17. The sympathy of His Excellency Sir George Clarke with industrial matters is manifesting itself in various ways. As an instance may be mentioned, the Conference of representatives of Co-operative Credit Societies which was held on 18th Dec. 1908, under his auspices at the Bombay Secretariat. In an excellent speech His Excellency appealed to the educated men in the Presidency to take an active interest in popularizing the advantages derived from such societies.

18. The Agricultural Department organized a sale of Broach Cotton grown in the Dharwar District. Samples were taken from each cultivator's produce, and Ginning percentage carefully tested and recorded. The auction sale was held in the Dharwar Municipal grounds, at the end of April last, the cotton merchants of Bombay and other places being asked to attend the sale. This was indeed a step in the right direction as much good will be accomplished, if Government Departments and officials were to work hand in hand with the Ryôts.

19. His Excellency Sir George Clarke takes a personal interest in the new scheme for the establishment of a College of Mechanical Engineering in connection with the Science College, Poona, a grant of 3 lakhs of Rupees has already been sanctioned by Government.

20. Mr. J. Nissim, I. C. S., is engaged on the compilation of a monograph on "Wire and tinsel in the Western Presidency." The work was expected to be in the hands of the Bombay Government early in November last.

MADRAS.

21. The Government of Madras has appointed a Committee of experts to investigate the possibility of Chemical Industries in the Presidency. The inquiry is to embrace the following 19 Chemical Industries.

1. Fuel.
2. Destructive distillation.
3. Colouring matters and dyed stuffs.
4. Bleaching, dyeing and printing.
5. Acid and alkali manufacture.
6. Glass and pottery.
7. Cement.
8. Electro-chemistry.
9. Electro-metallurgy.
10. Oils, fats, wax and soaps.
11. Pigments.
12. India rubber.
13. Tanning.
14. Manure.
15. Sugar.
16. Brewing.
17. Paper manufacture.
18. Preparation of essential oils and extracts.
19. Manufacture of refined chemicals and alkalies.

22. The Madras Government have appointed another Committee to report on a scheme submitted by the Director of Industries, Madras, for the establishment of a charcoal (wood distillation) factory on the Nilgiri Hills. The object of the proposed factory would be to supply acetate of lime to the Cordite factory and to develop an export trade in bye-products.

23. H. E. The Governor of Madras performed the opening ceremony of The New Victoria Memorial Hall on 23rd April 1909. The hall has been constructed partly by public subscription and partly by grant from Government, at a cost of nearly two lakhs of rupees and it is intended

to form the head quarters of the Victoria Technical Institute, of which the foundation stone was laid by H. R. H. The Prince of Wales in January 1906. The object of the Institute is to foster Indian Arts and Industries and the Hall is designed to be a permanent place of exhibition and sale of artistic handicrafts of the Madras Presidency.

24. The new tannery at Sembiam commenced work in 1908. The new machinery purchased from England has proved satisfactory. The total sales of Chrome leather amounted to more than a lakh of rupees. His Excellency the Governor of Madras at the meeting of the Legislative Council expressed a hope to be able to sell the Sembian factory as a going concern just as the aluminium factory was.

25. The Government of Madras have promised to contribute a sum of rupees one and a half lakhs spread over a period of three years to the Tata Research Institute (The Indian Institute of Science) of Bangalore.

It has also undertaken the establishment of a weaving school in Jammal Madugu to improve an existing village Industry.

26. A very interesting monograph has recently been compiled by Mr. P. F. Tyson, Professor of Botany, Presidency College, Madras on the hybridizing of different varieties of Indian cottons. "Mr. Tyson commenced his experiments in 1904, to ascertain whether the results of crossing Indian varieties of cotton plants were governed by any law, which would guide similar attempts to breed new and improved races, and whether any unit characters exist or can be found capable of being transmitted through five generations of cultivation. He now declares that the cross breeding of the varieties selected by him could be carried on almost with mathematical precision as regards the characters studied by him.

27. A very instructive note has been issued by Mr. Alfred Chatterton, Director of Industries, Madras in connection with well boring which contains directions for carrying on the experiments in well-boring with the

aid of tools and appliances, which can be obtained from Messrs. Burn and Co. of Howrah.

28. The Government of Madras has made a grant of Rs. 5000 to the Victoria Technical Institute from Provincial Funds, to assist the council in carrying out the memorial scheme and to help them to do more than is now possible to develop the art industries of Southern India.

29. The Coimbatore Agricultural College and Research Institute was formally opened by His Excellency the Hon'ble Sir Arthur Lawley on 14th July 1909, the foundation stone of this College having been laid in Sept. 1906. The aims and objects of this College may be fully described as below in the words of the Hon'ble Mr. Castle Stuart Stuart who presented on that occasion an address to His Excellency the Governor on behalf of the agricultural Department :—

“The manuring of paddy and the Scientific feeding of cattle are at present receiving the special attention of Mr. Harrison, the Agricultural Chemist and Dr. Barber, the Economic Botanist of the Institute.”

* * * *

“When Research has done its work and can point with confidence to definite lines of improvements the problem of how to influence the ryot will have only been half solved. It is in order to provide an efficient Indian agency to take up the work at this stage and to carry it to the villages and fields, that the Agricultural College is founded. The District Agricultural Associations, some of which have been doing excellent work, are clamouring for such an agency and your Excellency is frequently asked to establish new agricultural stations, which for want of qualified persons to work them cannot for the present be started. While it is our ultimate hope that experts qualified for the Research work will at all events receive part of their training here, it is primarily the practical expert that we hope to produce from the Agricultural College” The course of instruction will last for 3 years and embrace

Chemistry, Botany, Physics, Veterinary Science, Agricultural Engineering and General Agriculture.

BENGAL.

30. The Secretary of State has sanctioned the creation of an appointment of Superintendent of Industries and Inspector of Technical and Industrial Institutions in Bengal. The Government Weaving School of Serampur, started recently has proved of much benefit to young students of the neighbourhood. Out of 80 students, 40 boys are reported to belong to the weaving class.

31. Mr. Gourlay the Director of Agriculture, Bengal, is, it is reported, making a tour in the gardens of Darjeeling with a view to establish Co-operative Credit Societies among the garden coolies.

32. At Pusa an interesting experiment in Sericulture (or Silk Industry) is being tried by feeding the Silk worms on the leaves of castor plant in place of mulberry leaves. Silk produced by this process fetches about Rs. 80 per maund in Calcutta leaving a fair margin of profit.

33. Good progress is reported to have been made with the buildings and works of the Agricultural Institute attached to the College at Pusa during the last year and the Phipp's laboratory was completed. The laboratory is fitted with up-to-date internal fittings for Chemical, Bacteriological, Botanical, Physical and Entomological work and gas, water, and electric connections have already been laid on in several sections. When the Institute and College have been fully equipped and completely furnished, they will become model institutions of their kind in India.

34. Experiments are being made in fruit-culture on a large scale in the orchard lands at the Pusa Agricultural Research Institute. The results are reported to be of considerable practical importance.

UNITED PROVINCES.

35. The United Provinces Government have established Technical Scholarships of £ 150 a year, each tenable

for 2 years to enable students to proceed to England for instruction in Tanning or in the manufacture of Essential oils and perfumes. The possession of a University Diploma by the candidate is not essential but he must have thorough knowledge of English and must be qualified by scientific education or practical experience to take up any of these branches.

36. Those interested in the Industrial advancement of India are probably aware that an Industrial Conference was held at Naini-Tal in 1907, under the auspices of the U.P. Government, when a scheme was submitted to the Supreme Government for the establishment of a Technological Institute at Cawnpore, on the model of similar Institutions in England and other countries. and the development of the mechanical engineering and electric-engineering departments of the Thomason college at Roorkee. Certain other recommendations were also made for the promotion of Technical Instruction in the Province. Out of these recommendations a few, which were of minor importance have been approved by the Secretary of State and funds also have been sanctioned for their practical working. But the proposal to establish a fully equipped Technological College, at Cawnpore, which was by far the most important one, has not been sanctioned by him.

37. It will be gratifying to know, however, that substantial additions have been made to the Thomason College, Roorkee. The Credit for the expansion of Technical Education in U.P. is mainly due to the untiring exertions of Sir John Hewett, the Lieutenant Governor of the United Provinces, which deserve to be gratefully acknowledged by the public of India. On the occasion of opening the new laboratories of the Roorkee College, on the 27th October last, Sir John Hewett made certain announcements which are summarized below :—

- (1). The new Laboratories, Photo-mechanical

Building, Electric Installations, and power plant and Civil Engineer Students' quarters were declared open.

(2) The requisite improvements have been effected in the Lucknow Industrial School.

(3) The School house at Gorakpur has been completed and the school will shortly commence its work.

(4) Small demonstration Stations have been opened at four centres to familiarise cottage weavers with simple improved processes of warping and fly shuttle weaving, Almora being selected to work up a portion of the wool imported from Tibet. Benares is another proposed centre for weaving experiments under the supervision of a European expert.

(5) Funds have been allotted for a school of Industrial design at Lucknow and a carpentry School at Bareilly.

(6) Accommodation needed for the proper utilization of the services of a Professor of mechanical Engineering will be available after the vacation of 1910, for which sanction has been applied for.

38. The appointment of an Instructor in Cotton Spinning and machinery has been sanctioned for the Technical and Industrial class at the Civil Engineering College, Roorkee.

39. There are about half a dozen weaving schools in the U. P. under the control of the agricultural department, which have turned out about 250 students. The students turned out by the school have greatly facilitated the establishment of about 16 hand loom factories which are now in operation in the districts.

40. Grand preparations are being made at Allahabad for holding an Agricultural and Industrial Exhibition in December 1910. The management of the Exhibition has been entrusted to men of wide experience and much public interest has been evoked. (*Vide* also Section B.)

EASTERN BENGAL AND ASSAM.

41. For the development of the industries of E. B. and Assam the local Government placed Mr. Gupta, I.C.S.

on special duty in April 1908, to make a preliminary survey of the industries and resources of the Provinces. With reference to the report submitted by Mr. Gupta, a Conference had assembled at Dacca, on the 25th February last, to consider the whole question of industrial development, and to advise Government generally as to the form which state aid should take in fostering the existing and pioneering new industries and to consider the existing position of the Provinces in regard to Technical Education. The Conference which concluded its deliberations on 3rd March has passed a set of 70 resolutions and have submitted them to the Government with their recommendations for the establishment of a Department of Industry for control of Technical Education, pioneering of new industries by improved processes &c.

42. The Government of Eastern Bengal and Assam also deputed Babu Ambikacharan Dutt for making inquiries into the actual condition of the Poultry Industry of the Provinces, and to suggest measures for the expansion of this industry. Mr. Dutt has now submitted an informing Report on this question.

A very large trade already exists. Ducks, fowls, and eggs of the total value of Rs. 200,000 were exported to Burma from Noakhali and 1,00,000 from Tippera, and about 1,00,000 from Chittagong. Mr. Dutt has suggested that Government should found a Poultry farm at one of these places.

43. Mr. Finlow the fibre expert, has given an account of his experiments as to whether Jute can be grown profitably in other parts of India. The results appear to show that this plant can be cultivated in the Bombay Presidency, the C. P., Madras, Punjab, and also in Burma. At a place near Poona, the experimental plot has yielded a profit for the first time; trials in C. P. by the Agricultural Department have shown that Jute can become a useful rotation crop. On the Malabar coast, one crop is reported to have grown nine feet high in two months.

PUNJAB.

44. The Secretary of State has approved of the establishment of a Government School of Engineering in the Punjab. The present temporary school is located in the Mayo Art School and inquiries are being made for the selection of a permanent site. The teaching staff will be selected from the Provincial P. W. D. with the Executive Engineer as Principal.

45. A monograph has been issued by the Punjab Government on "The Wire and Tinsel Industry of the Province." It is based on a minute inquiry into the methods of wire drawing and tinsel making as actually used by the native artisans, and shows how owing to foreign competition, with machine made products, these industries have almost reached the verge of extinction.

46. From the annual report on the working of the Co-operative Credit Societies recently published by the Punjab Government, it appears that with the exception of Gurudaspur District, Rural Banks have increased in number by 58 and their aggregate assets have risen from $5\frac{1}{4}$ to $8\frac{1}{4}$ lakhs, notable feature being the insignificant expenditure on working and management, when compared with the amount of business transacted.

The effect of these societies has become manifest, the money lenders having in many places, lowered their rates of interest.

47. The annual Report issued by the Department of Agriculture in the Punjab for the year ending 30th June 1909 shows that although the Department is in its infancy and is handicapped by want of buildings and staff, it has more than justified its existence by useful and practical work done during the year.

The progress of the Department has been summarized below :—

- (1) Agricultural machinery is growing in popularity both among the Jamindars and the Ryots.
- (2) Visitors to the Agricultural Stations evince a keen

desire to learn new methods and results of new experiments.

(3) Experiments are being made to revive Sericulture and have been attended already with a fair measure of success.

(4) As a result of experiments, a Cotton properly suited to the Province, has been selected.

(5) Trials are being made to cultivate Jute.

CENTRAL PROVINCES AND BERAR.

48. The C. P. Administration is reported to have established an experimental Silk Farm at Argoda in the Chanda District for the purpose of reviving this Industry in that District, where it was once flourishing.

49. The C. P. Government have granted a lease to the Tata Iron and Steel Co. Ltd., of a tract of limestone in Murwara Tahsil of the Jubbulpore District.

50. Mr. M. N. Parmeshwar Kurup, L. M. E., F. T. S., who is a stipendiary student from the C. P. Government for Mining Engineering in the Edgbastan University, Birmingham, has secured the honor of an associate member of the Institute of Mining and Metallurgy of England. He is now deputed for practical training in the Madley Colliery.

51. The Agricultural Departments of the C. P. and Berar are attempting to grow the best grasses of the two Provinces as an ordinary commercial crop. Experiments are being tried at the Akola Agricultural Station in Berar to grow fodder grasses which it is believed, can be profitably grown in the neighbourhood of large towns in Berar, where the prices of grass are very high and where there is a large mortality among cattle every year.

52. The formal opening ceremony of the Berar Victoria Memorial Technical Institute of Amraoti, which was performed on the 10th November, by the Hon. Mr. Phillips, Officiating Chief Commissioner of the C. P. may be looked upon as one of the most notable events in Berar. The Institute is a memorial raised to the memory

of the late Queen Empress Victoria and owes its existence to the munificence and public spirit of the people of Berar, who contributed about one lakh and a quarter of Rupees for the purpose. Government have contributed Rs. 30,000 towards initial expenditure and have promised an annual maintenance grant. There is an endowment fund of Rs. 56,000. The affairs of the Institute are managed by a governing body of nine persons, out of whom four are Government officials and five Indian non-officials.

Instructions will be given in Mechanical Engineering on the lines of the Bombay Victoria J. T. Institute. Great hopes are entertained regarding the usefulness and future prospects of this undertaking, which is the first of its kind in these Provinces. A fine building and a fairly well-equipped workshop and laboratory have been provided.

This Institution will grant a diploma of Mechanical Engineering, C.P. and has been recognised as an Institution whose students are permitted to appear for the examination for second class Engineer Certificate under the C. P. Boiler Act.

BURMAH.

53. It is gratifying to note that simultaneously with the development of the Agricultural Departments in India, the Burma Government also is trying to popularize agricultural experiments with the cultivators. New varieties of paddy are being introduced in several Districts and there is a marked progress in the working of the Agricultural Department.

54. In the beginning of November a Conference was held in the office of the Director of Public Instruction to discuss the needs of technical education in Burma. After a discussion it was unanimously decided that a Central Technical School for Industrial Education in the Vernacular be opened at Insein. It is also proposed to start local Industrial Schools for small Industries such as carpentry, &c.

INDIAN STATES

55. Mysore:—The Government of Mysore will award ten Technical Scholarships tenable for a year from January 1910 for training in those arts and industries for which facilities of education do not exist in the Mysore State. The Scholarships will be of the value of Rs. 15 and Rs. 20 per month each and will be awarded annually to selected students. They will be tenable in the first instance for one year only and may be continued for a total period of three years on the recommendation of the Head of the Institution which the student attends.

The Scholarships will be available for students joining any of the institutions named below :—

- (1) School of Art, Madras.
- (2) Sir J. School of Art and the Reay Art-Work Shop, Bombay.
- (3) Victoria J. T. Institute, Bombay.
- (4) Veterinary College, Bombay.
- (5) Do. Madras.
- (6) Davar's College of Commerce, Bombay.
- (7) Engineering College, Sibpur.

56. The annual Dassera Agricultural and Industrial Exhibition was held at Mysore in October. It was opened by his Highness the Maharaja, and prizes for the best exhibits were as usual distributed. As in the case of previous exhibitions, the Agriculture Section was the most attractive. 11 Gold and 40 Silver and several Bronze medals were awarded.

57. As mentioned above, the scheme for the administrative organization of the Indian Institute of Science Bangalore, has been completed. The members constituting the Court of Visitors have been appointed and a Council will soon be formed.

It is expected that the laboratories and buildings will be completed by the beginning of 1911. Four or five departments will be opened at an early date.

58. The Government of the State has awarded three

Engineering Scholarships of Rs. 30 a month tenable at the Madras Engineering College for 3 years. In addition to these, two Agricultural Scholarships will be awarded tenable for 3 years. The rates of the Scholarships are :—1st year Rs. 10, 2nd year Rs. 12-8-0, and Rs. 15 for the remainder of the course. The Scholars must join the Agricultural College, Coimbatore.

59. Baroda:—In our last year's Report allusion was made to the Economic and Industrial Survey which was ordered by H. H. the Gaikwar to be carried out under the superintendence of Mr. Whitenack, the Economic Adviser to the State. It appears from the last Annual Report of the Baroda State that this Survey has since been completed, and the inquiries appear to have given a sudden impetus, to Industrial enterprise in the State, as many new Oil Mills, and other factories have been started or projected in consequence of this survey combined with practical and expert advice.

60. Baroda also possesses a Commercial Intelligence Bureau which has been established for the purpose of supplying to the public, information on Commercial and Industrial matters. Statistics are also collected for the use of merchants and manufacturers. The Baroda Durbar has also introduced Sericulture at their silk farm at Songad in their State. The prospects of this Industry are reported to be very promising.

61. The Indira Raja Weaving Co. is proposed to be started at Baroda with a capital of about a lakh of rupees. Nearly 100 hand-looms of improved patterns will be set up at the outset for weaving cotton, woollen and silk fabrics of various grades under the superintendence of Mr. Yodda who is an expert in the line, and has himself devised a new hand-loom.

The Baroda Union Dying, Bleaching & Calico Printing Factory Co., Ltd., has been started recently under the auspices of H. H. the Gaikwar.

62. The Maharaja with his well-known keen interest

in industrial matters, has sent six students this year to different Educational Institutions in India for learning some useful Technical arts, in addition to the students who are receiving technical instruction in England and Japan under the patronage of His Highness.

The total expenditure incurred by the State on Technical Education now amounts to Rs. 16,41,241. Two teachers of the Baroda High School were sent to the Secondary Teacher's College, Bombay, during the year and four more will be sent, two to Bombay and two to Madras, the former for the Senior Teacher's Certificate and the latter for the degree of Licentiate of Teaching.

63. Kashmir :—The Kashmir Durbar has sent a few intelligent students to Europe to study various branches of technical Education by awarding a number of scholarships : A few scholarships have been granted also, to students for studying in the Thomason Engineering College, Roorkee, and the Victoria J. T. Institute, Bombay.

64. H. H. the Maharaja Sir Pratap Singh, the Ruler of the State has evinced keen interest in industrial matters and has applied his knowledge of Science to the government of his country, as can be judged from the largest of the Public Works undertakings, recently completed by the State *viz.*, Jhelem Electric Power installation for the purpose of opening out the country by a Railway system to be entirely worked by electricity. The machinery for the project has been supplied by the General Electric Company of New York. The total outlay for the whole scheme has been estimated at about 62 lakhs.

65. Cochin :—The Durbar has granted 2 Scholarships for the training of students in the Dehra Dun or Coimbatore Forest Schools and 2 Technical Scholarships, one tenable in foreign countries and the other in any Technical Institute in India. The scholarship-holders will be bound to serve the State at least for 2 years.

66. The Durbar has resolved to grant further leases

of forest lands for the cultivation of rubber, the experiments having been so far successful. As the result of the inquiries it has been ascertained that lands to the extent of 5,500 acres in the valleys of Chimori and Muppili Rivers in the Palapilly Forests can be opened out for rubber which bids fair to be a very lucrative industry in the State. The Cochin Government are therefore, ready to receive applications for lands for rubber cultivation.

67. Sitaram Spinning and Weaving Mills Co., has been started at Cochin under the Patronage of H. H. the Raja Rama Varma who is one of the Directors.

68. Arrangements have been made through the British Residents to afford every facility to Mr. K. Raghava Kurup to acquire theoretical as well as practical knowledge of Tanning in a Government tannery under Mr. Cotton, Director of Industries as a preliminary training before he proceeds to Germany. A maintenance allowance of Rs. 25 per month and a consolidated fee of Rs. 150 for a period of six months have been sanctioned by the State.

69. The Cochin Durbar has placed Mr. Achyuta Menon on special duty to conduct an Industrial and Economical Survey on the lines followed in British India, with special attention to the improvements of Education of the backward classes, with reference to the industrial development.

70. *Bhavnagar* :—An Oil Mill is reported to have been started at Bhavnagar for which the State has promised important concessions.

71. *Cooch Behar* :—Those interested in the manufacture of cigarettes will be glad to know that a few varieties of American Tobacco have been successfully cultivated in the Experimental Farm in the Cooch Behar State, and the process of their curing has also been attended with success.

72. *Sirohi State* :—A Sugar Factory was opened in the State in January last for which the Durbar has granted

substantial concessions. The concern has been started by Mr. Nagindas P. Sanghani.

Section B.

INDUSTRIAL ACTIVITY OF THE PEOPLE.

GENERAL.

INDIAN ENTERPRISE IN ENGLAND.

1. The Indo-European Trading Society which was registered in May last by some enterprising Indian gentlemen is showing a steady progress. It has been established with the object of:—

(1) Placing before British public articles of Indian Art and Manufacture and produce; for the purpose of creating a demand for them in England and other European countries.

(2) To supply European machinery with the latest improvements for the manufacture of different articles in India. The Society secured for Indian manufacturers prizes and other awards at the last Franco-British Exhibition.

2. A very ingenious contrivance has been invented by a Parsee gentleman in England to make forgery an impossibility. The contrivance will be publicly demonstrated for the first time at the Annual Exhibition of model Engines that is to be shortly opened at the Horticultural Hall, Westminster.

3. From the letter contributed to the *Indian Patriot* by one of its correspondents, it appears that Mary Chowey, younger daughter of Mr. Krishna Chowey of Bombay, has returned from America after completing a 3 years' course in Kindergarten at the Folt Institute, Herkimer, New York. This is a welcome news to all interested in Kindergarten which has been regarded in America as a very important branch of manual training.

4. A new bank styled The Eastern Bank, Ltd., has been formed under the auspices of the Sassoons, with its

Head Office in London. The authorized capital is one million sterling of which one half is fully paid up, a few shares only will be issued for the Public. The Company will carry on its banking business in India, and its registration will be completed in a few days. The Bank has secured the support of the great house of Messrs. Rothschilds. Capital will be subscribed both in England and India.

5. The Co-operative Credit movement is making a very satisfactory progress all over India. It would appear from the report of the third Conference of the Registrars which was held at Simla in October that during the 12 months ending with 30th June 1908, the grand total of the working capital of these societies, had increased from nearly 2½ to over 4½ lakhs. An eminent authority like Mr. Wolff, has expressed the opinion that nowhere has this movement attained so much success in its earliest stages as in India.

6. Thirteen Indian students have been entered for the Sessional Course of the London School of Economics and Political Science where a series of lectures will be delivered by eminent Professors on various subjects, and we hope the students will reap the full benefit of the courses of instruction.

BOMBAY.

7. It is not generally known to the outside public that a few philanthropic millowners and patriotic gentlemen of Ahmedabad are rendering excellent help to the Bengali students in acquiring practical knowledge in the different processes of weaving, spinning and engineering as applied to mill industries. We are told that more than 30 or 40 students have completed their training and gone back to their homes and are helping the mill industry of their own Provinces. The tuition is absolutely free and the Bengali students are quite satisfied with the kindness and courtesy that is being shown to them by their Gujarathi brethren.

8. Several new spinning and weaving mills and other factories have been started during the year in the Bombay Presidency.

The Bombay W. and Manufacturing Company, Limited is proposed to be started at Bombay with a capital of 10 lakhs divided into 10,000 shares of Rs. 100 each. The Standard Woollen Mills, Ltd., Bombay, has been started under very favourable auspices, as there is a large and growing demand all over the country for woollen fabrics of Indian make. The mill will at first undertake the manufacture of cheaper kinds of goods for which there is an immediate and unfailing demand and later on, the Directors promise to develop the business in such directions as experience may suggest.

9. Professor Lees Smith of London School of Economics who was invited by the Bombay Government to deliver a series of lectures on commercial subjects addressed on 20th February last, the Mill Owner's Association in connection with the proposed faculty of Commerce, with special reference to the question of expense. Mr. Jamsetji Ardesir Wadia and Mr. Manmohandas Ramjee are reported to have offered to contribute Rupees one thousand each towards a scholarship fund for the proposed College. It has been suggested by Prof. Lees Smith that some students from India should be sent to England to be trained as qualified Professors and this suggestion was recommended by Mr. Fazulbhai Karimbhai Ebrahim to the commercial bodies and the members of the Bombay Mill Owners' Association for favourable consideration at their annual general meeting held on the April last and he expressed a hope that the members would amongst themselves subscribe for a scholarship in the name of the Association. Mr. Karimbhai also dilated on the advantages of commercial education and the influence wielded by commercial men of other countries in the administration

of their Government citing the vivid instance of the electors of Lancashire who could force the Secretary of State for India to levy an excise duty on Indian Cotton goods. If commercial men of India were properly educated they are, according to the opinion of Mr. Karimbhai, sure to exercise much influence for good in the administration of their own country. Sir Jacob Sassoon has given a donation of 2 lakhs of Rupees for the proposed commercial College for Bombay.

10. A new magazine has been started since September, by the students of the Agricultural College, Poona, for discussing agricultural subjects and disseminating useful information for the benefit of Agriculturists and the general public. Judging from the get-up and the contents of the first number sent to this office, the *Magazine* bids fair to be a success. The first article has been contributed by Dr. H. H. Mann, D.Sc., the Principal of the College, who is also a member of the Magazine Committee and is already well-known for his active sympathy with the cause of agricultural development.

11. Another venture, lately started in Poona is the Clarke Industrial Works, Ltd., Poona. Dr. Kawasjee E. Dadachandji, L. M. & S., & J. P. is the Chairman. Messrs. M. K. Swamy Rao & Co., are the *Ex-officio* agents.

The following are the main objects of the Company :—

(I) To start factories and other undertakings for developing Indian Industries.

(II) To establish a well equipped Laboratory and carry on analytical, experimental and Research work for promoting the objects of the Company, in general.

(III) To buy, sell, manufacture and deal in vegetable, mineral and animal, raw and finished products, to make printing and other Inks Glass, porcelain and other mate-

rials in raw, intermediate or manufactured state, capable of being used for the operations of the Company.

(IV) To carry on business as iron foundries, brass foundries, metal workers, smiths, joiners, wood workers, metal manufacturers, Manufacturing analytical and consulting chemists &c.

(V) To purchase or otherwise acquire patents, licences &c., conferring an exclusive, non-exclusive or limited right to use any secret or other information regarding an invention which is capable of being profitably dealt with.

The objects of this company appear to be so numerous, wide and varied that it is impossible to say what particular Scheme they actually intend to take up, considering that to carry out even a single object efficiently and in a true business-like and practical spirit even lakhs of rupees, will not suffice. We would advise the directors of the company to be more modest in their aims by keeping one object before them at a time. For, instance, there is certainly a want not only in the Bombay Presidency but in the whole of India, of a library of Technical Books, or a fairly equipped laboratory for educative and experimental purposes but to start even one such institution on a decent scale will require an outlay of thousands of rupees and the work can be carried out only by experts in the line.

12. Among the efforts which are now being made all over India to start new industries may be mentioned the quinine and castor oil capsules which are being manufactured in Bombay by Dr. S. C. Kawrane & Son.

13. At Bedkihal near Chikodi in Belgaum District, a new Sugar Factory has been started by Shet Heeranand Tarachand with the help of an oil engine and Centrifugal machine.

Another sugar factory has been established by R. S. Appa-Saheb Warad the enterprising and rich millowner of Sholapur. The sugar turned out is reported to be of excellent quality.

14. The Laxmi Pharmacy Ltd., is started under the superintendence of Prof : T. K. Gajjar with the object of manufacturing from purely indigenous drugs, pharmaceutical preparations for which there already exists such a large demand all over India.

15. The Bomby Glass manufacturing Co., will shortly commence its work under the direction of the Hon'ble Mr. Gokuldas K. Parekh and others with a capital of one lakh.

16. The Indian Cotton Oil Co., Ltd. has been formed with a view to starting a mill at a suitable locality in Gujrath or Khandesh for crushing cotton and other oil seeds. As soon as the requisite number of shares is subscribed, the Directors will acquire a site for the factory and import the requisite machinery from Europe or America. Considering the enormous consumption in India of oils for manufacturing and culinary purposes, the importance of this industry cannot be over-rated.

The Navanet Oil manufacturing Co., has been lately started at Suart under the supervision of Prof : Gajjar, the distinguished Scientist of Bombay and of Messrs. Manikji Jetha Bhai Wardhamana and Co., with the main object of extracting oils from cotton seeds, ground nuts &c. After purifying them by chemical processes, the purified oil may be used as a substitute for ghee which is becoming dear.

17. The Belgaum Match Mfg. Co., was started recently at Belgaum with a capital of Rs. 30000-divided into 1200 shares of Rs. 25. each. The matches of the company have already been placed on the market.

Another addition to the Match Industry has been made by the Deccan Match Mfg. Co., which was launched early in the beginning of the year under review. The buildings have been secured ready made at Karad. The matches are reported to burn steadily and easily, the wood used being of good quality.

The Western India match works have been started at Bombay under the supervision of Mr. G. N. Potdar, B.A., who is a passed chemical Engineer from the University of Tokio in Japan. The special features of the Company are—(1) a laboratory about to be erected for the manufacture of the chemicals required, (2) Practical help given by Government Forest Officers with regard to the proper site, wood &c., (3) assurance of 6 per cent dividend to shareholders.

A Pencil factory has been started at Dharwar by Mr. Kamalakar. The construction of buildings and the fitting of machinery may have been completed by this time.

The Poona button Factory turns out excellent buttons of horn, Ivory and Black wood for Coats, Jackets, and Shirts. The buttons are well made and will stand comparison with imported articles of the type. Their prices are also reported to be moderate, Cutlery industry has also been added to this factory.

A new Umbrella Factory has been started at Poona by Rajmachikar Brothers at 429, Shanwar Peith, Poona, which manufactures all the parts of the Umbrella excepting iron ribs. The Umbrellas are reported to be of good quality. About 10 Doz. Umbrellas are turned out every day.

An Industrial Exhibition first of its kind in Sind was held at Hyderabad, under the supervision of Mr. Heeranand Khemsing, the Secretary, Mr. Gopaldas, the joint Secretary, Mr. Bulchand and others. Although it was hurriedly arranged, it is reported to have been a grand success, and was productive of much benefit to the general public and especially to Sind manufacturers, as it was found to be a very useful medium for the advertisement of Sind Pottery Wares, lacquer ware, cotton and silk hand made cloth of various description &c. Recently two Soap factories have been started in Sind, one at Shikarpur and the other at Hyderabad, the soap turned out is said to be of a very superior quality.

It is a well known fact that photographic Cameras and other materials worth millions of Rupees are annually imported into India from Foreign Countries, there being a brisk and growing demand for them. The enterprising firm of Messrs. S. Mahadeo and Son, of Belgaum with branches at Bombay and Bangalore deserves to be congratulated on their success in manufacturing Photographic Cameras of various description suitable for different purposes. These Cameras are reported to be of sound and superior workmanship and can match in point of durability and quality, articles of foreign make. We learn now that Messrs. S. Mahadeo and Son have also placed on the Market their Gold Chloride and nitrate of silver. All these goods are sure to have a large sale, if they are properly advertised.

We commend the efforts of the Belgaum firm to the notice of our countrymen.

The Swadeshi Automatic Hand Loom designed by the Salvation Army to meet the needs of the village weaver is regarded as one of the best of the kind yet placed on the Indian market. To meet its increasing demand all over India, the Proprietors have been compelled, it is understood, to establish a new factory on Clare Road, Byculla, Bombay, driven with a 40 H.P. Steam Engine. The factory was visited by H. E. Sir George Clarke, who expressed his approval of the simplicity of the Loom. Intending purchasers, should satisfy themselves regarding the claims of the looms.

On the 1st of December 1908, the Panvel Agricultural Association opened an Exhibition, cattle show and fair.

At the last annual Prize Distribution of the Victoria J. T. Institute of Bombay, the Hon. Mr. G. O. W. Dunn, Chairman of the Institute, delivered a lengthy speech on the progress of the Institution during the last five years, from which it is evident that notwithstanding the raising of the standard of education of students, desirous of joining to Institute and their fees, the number has increased by leaps and bounds. There have been additions

made to the buildings to accommodate the increasing number of students, as well as in the equipments of Workshops and Laboratories. The Institution has advanced both in efficiency and popularity.

A new Cotton Mill has been projected at Ahmedabad under the title of Gomtipur Spg. Weaving and Mafg. Co., Ltd., with a capital of 2 lakhs. The mill is intended for Coarse Counts for which there are only one or two mills in the Bombay Presidency. The old mills are making handsome profits, and better profits are anticipated by the promoters of the new venture.

A new mill styled the Manik Mill was opened at Sholapur on 22nd April last.

A new and important business has been built up by the energetic Mechanical Engineers, Messrs. A. D. Wadia & Co., in Bombay and Ahmedabad. Some of the exhibits placed by them in the last Nagpur Exhibition appear to have drawn the attention of several experts. Double action Macarthy Cotton Gin and an Oil Engine manufactured by them are reported to be of very sound make and do immense credit to their ingenuity and enterprize.

Branches of the newly established Bombay Merchants Bank have been opened at Ahmedabad and another at Rangoon.

To encourage Technical and Scientific training among Parsee Students, a proposal has been set on foot for raising funds for awarding silver medals every year, to Parsee Students, studying in the Victoria J. T. Institute.

It is estimated by an expert that in the Cotton Industry alone, Bombay Presidency employs 1,48,000 out of 2,11,000 workmen employed in that industry in the whole of India.

We have received this year a copy of the prospectus of the Industrial Development Scheme of India, from the Promoters. The scheme was registered as a charitable society on 20th February 1908 and is managed by a Board of Trustees. The Registered office of the Scheme is in Vetal Peit, Poona. The scheme has been started

mainly to promote the well-being of the poorer classes by giving them practical education in India and Foreign Countries.

The money collected will be utilized for.

(1.) paying scholarships and other expenses as a loan to duly selected Indian youths proceeding to foreign countries ;

(2.) pecuniary help to students, who would like to study any paying Arts and Industries in an Indian School ;

(3.) granting permanent allowances on certain conditions to persons prepared to devote their lives in influencing the masses to bring about an Industrial regeneration ;

(4.) bearing the expenses for obtaining information on different industries ;

(5.) starting small factories for maintaining destitute classes.

Sir Jacob Sasson intends shortly to provide a well-equipped Science College in Bombay.

The Hon'ble Mr. G.K. Gokhale performed the opening ceremony on the 20th of November of the Pathare Prabhu Exhibition of Arts and Industry at Bombay. From the details furnished by the Secretary of the Exhibition, it appears that it was a very successful affair. The Exhibition was divided into Photography, Needle-work, Embroidery, Art, Fancy work, Cabinet work, and Glass Decoration Sections. About 1,600 exhibits were on view, 850 of which were sent in by girls and 750 by boys of the Pathare Prabhu Community. The excellence of the majority of exhibits showed the progress made by the community in arts and industries, and the exhibits evoked the admiration of all present.

Samples have been received in the Industrial Conference office at Amraoti from Messrs. Tambat Brothers, who have got their factories at Bombay and Gwalior for making nibs. Nearly 20 different kinds of nibs are prepared by them. As regards finish and other qualities these nibs are equal if not superior to those of foreign make.

The Hon'ble Mr. Gokuldas Kahandas Parekh has submitted as Chairman of the Indian Cotton Oil Co. Ltd., his report of the working of the Company up to the end of September 1909. The Company was registered on 26th May 1909 and has acquired a suitable site for its buildings, within a few minute's walk from the Nawsari Ry. Station in Gujrat.

Ahmednagar Bank Ltd., was started on the auspicious Dassera day. The opening ceremony was performed by R. B. Mirikar, Honorary Special First Class Magistrate. The credit of floating this enterprise is largely due to Bala Sahib Deshpande, the well-known local pleader, who is a Chairman of the Bank.

A new Hosiery Industry known as "the Khurshed Company" has been started at 123, Dhobi Talao at Bombay. The Socks made by this Company are reported to compare favourably both in price and quality with those of foreign make. The thread and dyes used are purely Indian, and even the boxes in which they are packed. Socks are made in Wool, Cotton, and mercerised Cotton and Silk.

Best class of types are, it is reported, turned out by the Gujrat Type Foundry, which has already secured about 5 Gold Medals at various exhibitions.

The Hon'ble Sir Vithaldas Thakersey and Mr. Lalubhai Samaldas, the enterprising and well-known Merchants and Millowners are contemplating the establishment of a central agricultural Bank and the details of the Scheme, it is understood, will shortly be formulated.

In the month of May last, the first annual meeting of "The Engineering apprentice association was held in the spacious Prema-bai Hall at Ahmedabad, the chair being occupied by Shet Chinubhai Madhawlal C.I.E., one of the most prominent Citizens of Ahmedabad and a conspicuous figure in all the principal industrial movements in the City. The Association aims to afford opportunities for frequent inter-change of views amongst Employers"

Engineers, Foremen, &c., who are interested in the progress of mill Industry.

Additional grants have been made by H. H. the Gaikwar's Government, Messrs. R. J. Tata and his brother J.N. Tata to the School of arts Navsari, to meet, the expenses of a large workshop which has recently been added.

The results of the last City and Guilds of London, Institute Examination held in the Victoria J. T. Institute, Bombay, have been very satisfactory as will appear from the table given below :—

Subject.	No. of students appearing.	No. of successful Students.
Cotton Spinning ...	46	37 (7 in honor Grade)
„ Weaving ...	18	16
„ Dyeing ...	3	2
„ and Linen Bleaching	4	4
Mechanical Engineering	35	18
Electrical—Do— ...	42	16
Soap making ...	1	1
Calico and Linen Printing	1	1
Motor Engineering ...	1	1
Telegraphy ...	5	4
Telephony ...	4	2

These results compare very favourably even with those in England, the Papers and conditions of Examination being the same in both cases.

Through the courtesy of the Proprietors of the Bhisey Patents syndicate, 323 Essex Road, London N., we have received a copy of the Prospectus of “ Bhiso-type ” which is an invention of Mr. S. A. Bhisey, F. S. Sc., A. S. A., M. S. Eng. (London) who is a resident of Bombay. This is a machine, quite unique in its principle and construction and can be used for the work of type casting and composing as well. It is capable of doing both the functions at one and the same time simultaneously or can be used for only one purpose at a

time as will suit the convenience or the will of the operator. It has been very highly spoken of by Experts not only of England, but those of U. S. A. and Germany. Men of the type of Prof. Bhisey are an ornament to our country and will wipe away to a great extent, the reproach that is generally levelled at Indians for want of originality and inventive genius. Mr. Bhisey has proved, that equal opportunities being given an Indian Student is as much capable of progress as any other. Prof : Bhisey's machine is calculated to revolutionize the Printing and type casting Trade. Out of numerous testimonials, he has received, we may quote the following tribute of praise by the Inventors' Journal :—

“ It is a peculiar fact ” says this Journal, “ that with the known cleverness of the Indian members of our Empire, the mechanical inventive faculty does not appear to be a natural heritage ; therefore, it is all the more striking that it should have fallen to the lot of a native of India, to produce a result that a great majority of the cleverest Engineers of the world would have been striving to approach for years.”

The enterprising firm of Messrs. Kirloskar Brothers of Belgaum, have now taken up the manufacture of Iron Ploughs which is a distinctly new Industry in India and deserves to be patronized by agricultural associations in different parts of India. Their ploughs, chaff cutters and other agricultural implements are becoming very popular in the Deccan and can successfully compete with articles of foreign make.

An Association has recently been formed under the designation of “ Broach District art, industrial, commercial and agricultural association ” with its head quarters at Broach. The object of the association is sufficiently indicated by its name. It aims at introducing machinery and necessary implements, from other parts of India, and other countries, and to collect information to carry out

its objects. It also proposes to hold exhibitions and establish museums, for reviving different industries.

The Progress of the Tata Iron and Steel Co. Ltd., is being keenly watched not only by the general public of India but also by the experts and businessmen of foreign countries. It will, therefore, be noted with satisfaction that the 3rd report of this Company for the period ending with 30th September 1909, has been laid before the public. The construction of Buildings, for acquisition of mining rights and concessions from Railway Companies, construction of feeder lines and Railway sidings and the working of manganese mines &c., are progressing very rapidly according to the latest approved methods. It is also announced that before the end 1911, Steel, Iron and their products will be placed on the market.

Madras—The Indian Gold thread Manfg: Company has been started at Madras by Messrs: Muthu Venkatachala Chetties and others. This may be regarded as a first enterprize of the kind in the whole of India. The factories are worked by steam power. We wish the enterprize every success.

An Exhibition of indigenous industries was held at Madras in connection with the carnival of sports and amusements of this year. A new jute Mill has been started at Ellore in the Krishna District with a nominal capital of 5 lakhs for the manufacture of Gunny bags.

The report on Co-operative Societies shows a steady progress. Out of 101 societies in existence during the year, 94 were in working order. During the last year, about 5000 loans amounting to over 4 lakhs of rupees were given. Out of this amount about two lakhs were repaid.

The Guntur District Agricultural Association has set on foot an inquiry in connection with the apparatus for extracting oil from cotton seed and a reference being made to the Director of Agriculture Madras, were directed to address local firms who manufacture small hand screw

presses worked by four persons, in common use in the South Arcot District for extracting groundnut oil. The Presses are made at Pondicherry and are reported to cost about Rs. 750.

The foundation stone of the Coimbatore Mill mills Co., Ltd., was laid at the beginning of this year.

A Rice Mill has been established in Ganjam District by Mr. Pakaniti V. Naidu with labour saving machinery for cleaning Paddy and other processes.

The City Tobacco Company and the Aryan Hosiery Factory are the new concerns lately started at Bangalore and they produced articles valued at Rs. 24000 and Rs. 11700 respectively.

Under the auspices of the Sourashtra or Weaver's community at Madura, a factory has been started for making Gold and Silver thread. Machinery has been ordered from Lyons in France and Madame Fredon, a French lady has already arrived to take charge of the factory.

An Agri-horticultural exhibition was organised by the Jagirdar of Arni, at Satyavijayanagaram which was opened on the 3rd April last by the Hon'ble Mr. Murray Hammick, C.S.I., Member of the Council of the Madras Government.

An Industrial exhibition is reported to have been held at Kumbakonam in connection with the Mahamakham festival. A meeting of exhibitors was held in November at which medals were distributed. Mr. Wallingiri, a landholder and Mr. Vennala Naidu, proprietor of the "Royal Emporium" are trying to open a tile factory at Coimbatore on the model of the Basel Mission Tile Works of Mangalore.

Successful experiments have been made in glass-making at Ainnur, a few miles north of Madras, and a factory has accordingly been started at Madras, with a capital of Rs. 2,00,000 of which Rs. 1,60,000 have been called up. It appears that there is an abundant supply, in the neighbourhood, of raw materials required for making soda-water bottles, glass-tiles, &c.

The third Session of the South Indian Industrial Conference was held on 16th July last in the Kallikod-diamond-Jubilee Hall, Mr. K. Perraju, presiding. Among the resolutions passed, the chief one was for thanking Government for holding an Industrial Conference last year at Ootacamand, and for having given effect to a few of its recommendations and praying that the other recommendations of the Conference be carried out at an early date.

Mr. C. V. Raigam Chetti who has received his training at Calcutta and Baroda in the Hand-loom Weaving Industry has started the "Hanuman Weaving Co., Ltd." at Narayana Varam, North Arcot.

A Swadeshi fair was held at Masulipatam in June last with the active Co-operation of weavers and other manufacturers in the neighbourhood and it was a grand success.

A letter has been received from the Head-master of a new Institute of Electrical and Mechanical Engineering, started recently at Trichinopoly for teaching complete courses in these sciences with shop practice. It appears that the text-books used in this School, are of an American University, which is reported to have granted permission to the promoters of this schools to use them. The Institution started its work in 1908 with the help of Mr. R. Sheshashai who was specially sent to America to complete the training in the correspondence courses and has come back duly qualified.

The above Institution also manufactures Telegraph and Telephone Instruments, induction coils and other electrical fittings.

The Madura Industrial Association celebrated its first anniversary on 2nd August last, Mr. F. H. Hamnett, the District Judge being in the Chair. Mr. A. Rangaswamy Aiyar, B.A., B.L., Vice-President of the Association explained its aims and objects which are detailed below :—

1. Promotion of Arts and Industries in the country.
2. Practical training of work men.

3. Popularizing of improved apparatus, methods, and appliances.

Boochireddipolliem Weaving Factory is the name of the weaving concern started in Nellore District by a student trained in Government Weaving Institute at Salem, and is fitted with improved fly-shuttle and ordinary pit-looms.

Mr. S. R. Mannady, a Japan returned student and a pencil expert contributes an interesting letter to the Press describing the present condition of the Anakapalli Pencil Factory, the machinery it has ordered and the work it has been doing since its installation. Mr. Malladi (Coconada) is prepared to give expert advice in connection with pencil and felt-making.

A Swadeshi Spinning and Weaving Mills Company Limited has been started at Nellikuppam with a capital of fifty-thousand rupees. The company proposes to take up weaving business only in hand at the out-set.

The National Fund and Industrial Association of Madras has resolved to send this year two students to America with a Scholarship of Rs. 900 per annum for a period not exceeding 3 years with passage to and from under usual conditions laid down in the rules of the Fund.

Mr. Shrinivas Raghava Iyer of Rampet, Honorary Curator of Arni Museum, exhibited a number of colonies of live bees, at the Agricultural Exhibition lately held at Arni. They formed the most attractive exhibits. Mr. Iyer has studied the Art of Bee-rearing which is likely to prosper at Bangalore, as it abounds in flowers and the climate is cool and agreeable and specially adapted for Bee-rearing.

The Negapatam Swadeshi Steel Trunk Manufacturing Co., which has its office and workshop at Tanjore appears to be making a very satisfactory progress. This Company manufactures trunks, patent steel brief bags, locks, despatch boxes, &c.

The Madras Central Urban Bank, Ltd. is the title of a new bank started at Mylapore on the co-operative credit principles.

The Third South Indian Industrial Conference was held at Berhampur on 16th June last at which resolutions were passed thanking the Government of Madras for having given effect to some of the recommendations of the Ootacamund Industrial Conference.

The following resolutions were also passed :—

1. Government should open at least two Engineering schools, one in the Northern and the other in the Southern Districts for imparting instructions in Civil and Mechanical Engineering having regard to the growth of small factories and a general desire of youths to take up Industrial pursuits.

2. Attention of Jamindars be drawn to the great importance of introducing improved methods of agriculture and of investigating the mineral resources of their own estates.

3. The National Fund and Industrial Association of Madras be requested to take prompt steps to start a technical education fund for Southern India.

4. To enable indigenous goods to stand competition with imported articles, it is essential for people to support the products of Home Industries in preference to foreign commodities, even at some sacrifice.

A New Candle Factory has recently been started under the name of South India Candle Works at Triplicane, Madras, for making sterine candles.

Like Bombay, Madras possesses an Ayurvedic College and Dispensary. Both the Institutions are reported to be doing excellent work and the latter especially has attracted students from distant towns in the Punjab, Bengal, Assam, Hyderabad, etc., owing to the wide fame of its senior physician and principal Pandit D. Gopalarthu. There are about 24 students in this College.

BENGAL.

The Swadeshi Sugar Works Company has been established at Calcutta with the object of manufacturing

sugar from date-palm. Among the Directors may be mentioned the names of Maharaja Manindra Chandra Nandy and Hon'ble Mr. Justice Sharada Charan Mitra.

Four students sent from Bengal to America to complete their practical and scientific training in Agriculture have returned, after completion of their courses. Services of one of them have been utilized by the Government of Eastern Bengal and Assam, and the remaining three are employed at the Provincial Agricultural College.

Under the auspices of the Society for the promotion of Technical Education, the Bengal Technical Institute has opened 2 Departments. (1) Intermediate and (2) Secondary for the technical and commercial education of the Indian students. The Intermediate Department has for its object the turning out of skilled operatives and assistants to foremen, engine drivers, fitters, &c., both mechanical and electrical and mechanical draftsmen. Students who have read up to 4th class or 3rd standard are eligible for admission to this Department.

Each student is required to select any one of the special courses noted below :—

- (1) Mechanical fitting
- (2) Electrical fitting.
- (3) Electroplating
- (4) Lithography
- (5) Dyeing and bleaching
- (6) Tanning and manufacture of leather goods
- (7) Soap-making
- (8) Pottery
- (9) Carpentry.

The object of the secondary department is to turn out trained foremen, assistant engineers and industrial chemists, able to take charge of the factories. The special courses in this department are various extending from 3 to 4 years. This department is conducted by a French expert M. Coulon for some time Government analyst in the Paris Customs House.

The Culcutta Free Weaving school was inaugurated in the Calcutta University Institute by Sir Charles Allen, the Municipal Chairman with the main object of imparting free instruction in weaving to students and the people of the weaving class.

The use of Fly-shuttle appears to have been preferred by some of the weavers in the Pakour Sub-Division of Bhagalpur District in Bengal who have learnt the use of it. The weavers are helped by Mahajans who advance money or supply yarn.

The opening ceremony of the Oriental Match Factory took place on 1st February last at Konnagur in the Serampur District of Bengal. The Company has started with a nominal capital of one lakh divided into shares of Rupees 25 each. About Rs. 20,000 have been spent towards the cost of machinery.

In the Exhibition held by the Bengal National Council of Education about 477 articles prepared by the students of the Bengal National School, Calcutta, were exhibited. They represented mainly the articles usually required for experiments in physics and other sciences. Four microscopes worth Rs. 250 each were placed in the Exhibition and a delicate scale required for teaching chemistry. These and other articles appear to have attracted much attention. The workmanship and skill displayed by the students in their manufacture is very creditable to them as well as to the staff of teachers and professors.

Maharaja Manindra Chandra Nundy has, it is reported offered to endow a Technical Institute in Calcutta with a property yielding a lakh of rupees annually. Prospectus has been issued by the Tarpur Sugar Works, Ltd., which starts with a capital of 5 lakhs of Rupees.

Sulphate of ammonia is being manufactured by the Oriental Gas Company of Calcutta. It is used as a valuable manure and fertilizer for gardens. It can be had also from Messrs. D. Waldie & Co., Calcutta, who have been appointed agents.

Since the inauguration of the Swadeshi movement, many new steamship companies have been floated in Bengal. The general masses and the capitalists appear to have taken to this line of enterprise quite in earnest. The following companies are now working:—

- 1 Eastern Bengal Steam Service Co., Ltd.
- 2 Bengal Steam Navigation Co., Ltd.
- 3 East Bengal Mahajan Flotilla Co., Ltd.
- 4 The Co-operative Navigation Co., Ltd.
- 5 The Bengal Steamship Co., Ltd.

The Rangpur Tobacco Company, Ltd. has started a steam factory for making machine and hand-made cigarettes and other tobacco preparations. The factory was opened by the Commissioner of the Rajshahi Division in May last. Considering the enormous imports of foreign cigarettes into India, such ventures are quite welcome.

Prospectus has been issued by the Tarpur Sugar Works, Ltd. which start with a Capital of five lakhs of rupees.

Arya Cotton Mills is the name of a new Company lately projected in Bengal under the Directorship of the Raja of Narajole and Babu Promathanath Chowdhari. The promoters have secured the services of a European expert of long experience.

Mr. M. N. Ghose, Manufacturing and Chemical Engineer of the Japan Government Bureau who has specially studied among other subjects comb, button and mat-making, has started a factory at Jessore for making these articles. We wish the factory every success.

It has been proposed by some leading men of Calcutta to form a Swadeshi Chamber of Commerce for the protection and advancement of swadeshi industries.

The dealers in piece-goods have expressed their willingness to co-operate with the movement and the idea is welcomed by the public.

UNITED PROVINCES.

Mr. B. Mukhtan Singh of Meerut proposes to start a Pencil Factory with a capital of Rs. 20,000 divided into 2,000 shares of Rs. 10 each.

Under the Presidency of the Collector of the District, the opening ceremony of the Branch at Ghazipore of the People's Industrial Bank was performed on 15th May last. Mr. Sham Kishan Lall of Allahabad described the aims and objects of the Bank and said it would confer a great benefit on the Industrial classes. The Collector in his Presidential speech commended the efforts of Mr. G. L. Warma, the General Manager, and wished every success to the Bank.

The Manager Industrial Research House, Colonelgang, Allahabad, has prepared Brown Boot-polish, which is said to be equal in quality to the foreign article.

A new Industry has been started at Dehra-Dun. A spring in Sawadasan near Mussoorie, produces a variety of Mineral waters, which are said to possess the property of healing innumerable complaints. A Company has placed on the market bottles of the sausa waters collected and bottled by High class Brahmins.

The Brij Sugar Co. of Agra has been started with a capital of 5 lakhs. It will use machinery of the latest type and guarantees that no substance obnoxious to any religion in India will be used.

An Industrial Exhibition was held at Agra in April last, under the auspices of the Vaish Maha Sabha, with Rai Bahadur Lala Baijnath as General Secretary.

The foundation stone of the Prayag Sugar Works, at Naine (Allahabad) was laid in July last by Sir John Hewett. Rai Bahadur Ramcharan Dass is the Chairman of the Board of Directors.

East Indian Rolling Mills, is the name of a factory lately opened at Cawnpore, by the Nabob of Rampur. It is reported to be an extension of a small iron factory which was being worked by Mr. Fakiruddin. The esti-

mated output of this factory is about 40 tons in 24 hours. It is fitted with the necessary machinery for this purpose.

Grand preparations are being made at Allahabad for holding an Agricultural and Industrial Exhibition in December 1910. From the preliminary prospectus issued by the managing committee, it appears that the principal feature of the exhibition will be a display not only of the indigenous products (raw and manufactured) but also the methods of productions. To accomplish the latter object, it is proposed to exhibit running machinery adapted to various industries, large and small. This section is calculated to be a great help even to small capitalists to start new industries for the manufacture of various miscellaneous articles for which there already exists a large demand all over the country. Those interested in the industrial development of India are specially recommended to profit by this display of special machinery. This exhibition although essentially non-official in its character, has secured the hearty co-operation of the Local Government and the personal support of His Honour the Lieutenant-Governor, Sir John Hewett, K. C. S. I., who as first member for Commerce and Industry on the Viceroy's Council did so much for the trade and industries of India.

A new important industry hails from Benares, for the manufacture of Stylo-pens and Fountain Pens. Dr. R.N. Shahai's wireless stylo-pens can be had from the Laxmi Stylo Co., 16, Laxmikund, Benares City.

PUNJAB.

An Industrial Exhibition and a market of Indian made goods were held at Hissar in connection with the 16th Session of the Vaish Conference from 29th January to 3rd February 1909.

All-India Spinning and Weaving Mills Company has been floated at Lahore with a capital of 25 lakhs of Rupees. Messrs. P. C. Chatterji and Lala Lajpatrai are amongst the Directors.

A new enterprise for the manufacture of vinegar hails from Peshawar where a Company has been registered with a capital of Rs 10,000 under the title of Vinegar Manufacturing and Drugs Store, Ltd.

A Prospectus has been issued by the Paisa Akbar of Lahore of a projected Joint-stock Co., for the manufacture of Fez and Felt-hats which are imported into India every year from Austria, Italy and other countries to the value of thousands of Rupees.

An Exhibition of Arts and Industries was held at Delhi in May last. The opening ceremony was performed by Lala Lajpat Rai. The Exhibition was the first of its kind held at Delhi, and contained a fine collection of Indian arts, &c., for which much credit is due to the Executive members of the local Anjuman-i-Farra-i-Sanat-o-Hirfat-hued.

Under the auspices of the Indian National Congress of Lahore, an Industrial and Agricultural Exhibition of the Punjab, N. W. Frontier Provinces and Kashmir, was held in the spacious *maidan* facing Maharaja Ranjit Sing's tomb and the Badshai Mosque. The Exhibition was formally opened by His Honor Sir Louis Dane, the Lt. Governor of the Punjab on the 12th December 1909. The number of registered Exhibitors was 1,100 excluding many others who sent in their exhibits through the Deputy Commissioners or District Committees and also those, whose exhibits were displayed in the special courts reserved for Native States. With the exception of Bengal all the other Provinces as well as the Indian States of Kashmir, Patiala, Bhawalpur, Kupurthala, Faridkote, Mysore, Travancore, Baroda, Gwalior, Indore, &c., heartily co-operated in the holding of the Exhibition by sending the choicest exhibits that they could collect.

In his speech, which was marked by genuine sympathy with the efforts of the educated classes to make an advance in the industrial development, Sir Louis Dane took a very comprehensive survey of the agricultural and

industrial position and prospects of the Punjab which will amply repay a careful perusal and also suggested several industries capable of expansion.

The Exhibition was on the whole a grand success, and can be favourably compared with any of its predecessors

EASTERN BENGAL AND ASSAM.

As a result of last year's Conference, an association has been formed for sending out Behari students to Europe, America and Japan, for Technical Education a few days ago, the first batch consisting of one Hindu and one Mahomedan (Messrs. Bama Shanker and Enayat-Ullah) was sent out. Mr. Bama Shanker will study agriculture in general and the processes of refining sugar and curing tobacco leaves in particular. Mr. Enayat-Ullah is to learn the tanning work. Another young man Mr. Suraj Kumar-Prasad Singh from a well-known Kayastha family of Gaya has left for England to study Engineering.

The Industrial Conference held at Dacca in March last, was a grand success. Three Sub-Committees have been formed under the following heads—

General, Educational and Industrial; their function will be as described below :—

(1) The general committee will exercise a general supervision over the Industrial Department.

(2) The Educational Committee will be in charge of the work of imparting education to weavers and artisans and other Industrial branches to be taken in hand hereafter.

(3) The Industrial Committee will give practical advice and pecuniary help, if needed to Industrial concerns started under private management.

The three Committees have already made several recommendations for the consideration of Government. Much help will be rendered to weavers working with hand-looms.

A report has been submitted recently by the American

Consul at Bombay to his Government on the Tobacco trade and the large imports of foreign cigarettes into India. It appears from the report that at present the bulk of the import trade is controlled by the British America Tobacco Company, who have lately started a factory at Monghyr and purchased land for growing its own tobacco. This Industry is a very lucrative one and deserves the attention of enterprising capitalists of India and educated classes who desire to seek for openings in business, considering the vast quantities of tobacco preparations consumed in India and the successful experiments that are being made in various places to rear best classes of American Tobaccos.

The Behar Industrial Conference was opened on the 13th April last, at which resolutions were passed advocating the development of the Hand-loom Weaving Industry, and urging the preference of Indian articles even at a pecuniary sacrifice.

BURMA.

A new factory is being started at Rangoon which is styled "Burma Weaving, Spinning and Produce, Ltd.," with a nominal capital of 5 lakhs, for spinning and weaving cotton and jute.

The South Indian Industrial Association, Burma, has been founded at Rangoon with the object of providing promising young men of Southern India with the facilities for acquiring higher scientific and technical education in foreign countries. The Association has collected about 7,000 Rupees and a candidate has been selected.

Karin Co-operative Agricultural Bank is the name of a new bank started at Rangoon with a capital of 20,00,000 for helping agriculturists.

CENTRAL PROVINCES AND BERAR.

It is reported on good authority that several Marwari Merchants of the C.P. are about to form a syndicate for the manufacture of Asbestos goods. It seems that a big

mine exists near Kamptee, requiring development. The promoters of the scheme are negotiating with certain Bengalee Scientists in Calcutta, in order to carry out experiments with the Raw materials which are believed to be of the best quality.

The Raipur Weaving School is demonstrating the use of the Serampur loom and has, it appears, supplied trained hands to the Cloth and Carpet weaving workshops of the Feudatory States, the activity of the School has not, however, produced any effect on the weavers of Chattishgarh who have not yet adopted the fly-shuttle owing to their extremely conservative ideas.

The Berar Mfg. Co's. Mill had to augment and strengthen the dyeing Department at a cost of Rs. 25,000 to meet the growing demand for dyed yarn and cloth.

INDIAN STATES.

Mysore.—The Mysore Spinning and Mfg. Company had to enlarge its business by the addition of a flour mill which turned out flour, to the value of about 8 lakhs of Rupees, in addition to the usual out-turn of cloth and yarn.

Mysore Tannery Ltd., has been recently floated at Bangalore by a body composed entirely of Hindu citizens. The buildings were formally opened by the Prime Minister of Mysore State in October. The Company has been started with the object of organizing a leather Industry on modern lines, as there is a plentiful supply of hides in the State which are reputed for their excellent quality in Europe and America. The special feature of this concern is that the barking and chrome tanning will be done side by side, with the help of a body of experts, whose services have already been secured. The leather industry of the Madras Presidency is estimated at 4½ Crores per annum, the bulk of which consists of raw material which are eventually received back in the form of finished products at exorbitant prices.

Bangalore City Building Co-operative Society, Ltd.,

has been formed at Bangalore for raising funds for advancing loans and other co-operative purposes. The loans are repayable even in very small instalments according to the means of the borrower.

A notification has appeared in the *Gazette of India*, giving the names of official and non-official members, who compose the Court of Visitors of the Indian Institute of Science at Bangalore.

From the report of the Council meeting of this Institute, which has been communicated to the Press, it appears that within about 15 months, the Laboratories and buildings will be completed and four or five departments will be opened at an early date.

It is a very encouraging sign that Indian capitalists are turning their attention to the pioneering of new Railway lines. We have received a copy of the prospectus of the Bangalore Chakbalpore Light Railway Company, Ltd., which has been registered under Mysore Co.'s Registration Act. Four per cent. interest has been guaranteed with prospect of higher dividends.

Rajmahal.—It is not generally known that large deposits of China clay and fire clay exist in portions of the Rajmahal State. Up to this time, only one deposit, *viz.*, the one at Lohandia, was known. Since 1902, China clay has been worked at Mungal Hat. It is used by the Calcutta Pottery Company for the Manufacture of their China porcelain. It occurs in this District in 3 forms:—

(A) As decomposed product of felspar

(B) In white Damuda sand stone

(C) As beds of white China clay inter-bedded in the white Damuda sand stone.

The under-mentioned localities contain an abundant supply of the China clay:—

Katangi near Bastia

Karanpur

Dodhani

Base of Patter-ghatta hill, &c.

Those interested in the manufacture of China pottery or porcelain are recommended to read the records of the Geological Survey of India.

Cochin.—An Industrial and Agriculture Exhibition was held at Trichur on 8th February last. It was opened by His H. the Raja of Cochin who has evinced a very deep interest in the industrial and technical training amongst his subjects and in industrial development generally.

The Proprietor of the Pushpagiri Weaving Factory in Cochin is making arrangement for establishing another factory at Trichur with a capital of one lakh of rupees divided into shares of a thousand rupees each. This is stated to be the first attempt of the nature in this State.

Kashmir State.—Extra-ordinary profits are being made in Kashmir by persons engaged in Silk trade, which is making very rapid progress.

From the latest figures to hand, it appears that about 70,000 people are employed in connection with this Industry, and the rearing of cocoons has been most successful.

Central India.—A new Sugar Factory has been established at Agar (Malwa) fitted with steam machinery. Mr. Hadi's process is being adopted. The sugar turned out is reported to be of good quality.

The Indore Malwa United Mills, Ltd. is the name of a new mill started at Indore with a capital of 15 lakhs, divided into 15,000 shares of Rupees 100 each. At the outset 21,000 spindles and 500 looms will be worked. The Darbar of Indore is reported to have granted certain concessions to the factory with regard to land, &c.

Malabar.—Kerala Weaving Company is the title of a new weaving concern started under the auspices of the Malabar Industrial Improvement Sangham with a capital of 10,000 Rupees.

Kathiavar.—A new Ginning Factory and full cotton press were opened in April last in the State of Dhrangadra.

His Highness the Maharaja Sahib is seriously considering the question of developing the cotton trade in his dominions.

Bhavnagar.—An Oil Mill has been started at Bhavnagar with a capital of $1\frac{1}{2}$ lakhs of rupees to which the State is reported to have promised important concessions.

Lunavada.—An Agricultural Exhibition was organized at Lunavada under the auspices of His Highness the Maharana. Implements of Agriculture, specimens of seed, and other articles of interest were exhibited and practical advantages were explained to the cultivators.

Kolhapur.—Under the auspices of the Jain Parishad, an Industrial and Agricultural Exhibition was held last month at Kolhapur, when agricultural implements and machinery for various crafts and industries, agricultural cattle were exhibited in addition to swadeshi goods.

Travancore.—An Industrial and Agricultural Exhibition was held in June last at Ochira in Travancore State.

APPENDIX A

Industries.—

Survey of the hand-loom industry
of the Bombay Presidency.

General Department.

No. 4710.

Bombay Castle,

7th September 1909.

RESOLUTION OF GOVERNMENT.

In ordering a survey of the weaving industry of this Presidency, Government observed that :—

“ Among indigenous industries in Bombay, the Hand-Weaving Industry stands first in point of view of the extent of the population supported thereby, the need for assistance which recent competition from the power industry has created, and the scope for such assistance which is revealed in the numerous improved processes and implements now under trial. The assistance of Government has recently been claimed in one direction for popularising the use of an improved loom, in another quarter for perfecting by experiment a new loom of a different type. Improved warping processes are under examination, with the help of a Government subsidy, and local bodies in certain districts have granted funds for the instruction of weavers in the use of looms of a more modern type than those now in general use.

“ It therefore appears to Government that a reasonable prospect exists of valuable results from an industrial survey which should commence with an expert examination of the weaving industry of the Presidency. His Excellency the Governor in Council has accordingly selected for the undertaking a recent holder of a Government of India scholarship for the study of the textile industry in England, Mr. P. N. Mehta.

“ Mr. Mehta will, therefore, be given a temporary appointment for a term of six months for the purpose of

visiting the chief centres of the hand weaving industry in this Presidency. He should prepare a comprehensive report, in which the present position of the industry and the practical measures that commend themselves to him for its assistance should be fully explained. In his report Mr. Mehta should deal specially with the following important points :—

(i) Defects in the preliminary processes including reeling, warping, and sizing of yarns for the loom.

(ii) Defects in the type of loom and appliances used for weaving.

(iii) Defects in the system of procuring raw material, in securing the capital necessary to cover the cost of production of the finished cloth, and in placing it on the market.

(iv) The possibility of introducing co-operation in the methods of working, or in financing the industry.

“Mr. Mehta's attention should also be drawn to the new loom invented by the Salvation Army, to the experimental work in progress at the American Mission school at Ahmednagar, to the Japanese looms on trial in Belgaum City, and to the fly-shuttle attachment that is being successfully worked in the looms at Pandita Ramabai's Home at Kedgaon in the Poona District.”

2. Mr. Mehta's conclusions on the survey of hand weaving in this Presidency may be summarized as follows:—

(1) The chief defects of the present system are—

(a) The slow and costly preparation of warp.

(b) The slow and wasteful method of stretching the warp on the loom.

(c) The primitive type of loom employed.

(d) The uncommercial method adopted in buying yarns and selling the woven fabric.

(2) The adoption of an improved loom must be preceded by an improved supply of warp.

(3) There is not yet in the market an improved loom suited to the needs of the majority of weavers in this Presidency.

(4) The outturn of the present old fashioned loom can be increased 20 per cent. by a supply of well-made warps on a beam.

(5) The supply of warp beams requires the use of winding and warping machines, and a beaming apparatus.

(6) No one weaver can afford to use these machines for preparing his own warp. They involve the investment of capital, and a production of warp far in excess of the requirements of one weaver.

3. To these conclusions, Mr. Mehta adds the further fact that the weavers are almost all in debt to merchants supplying yarn and taking in exchange the finished product of the looms. Mr. Mehta estimates the number of these weavers at about 75 per cent of the whole. Thus, it follows that, inasmuch as these weavers are in the hands of the capitalists, the increased profit to be derived by improved methods of production and the use of superior implements would not be retained by the weaver, but would be claimed by the merchant who would continue to allow the workers merely enough for subsistence. Mr. Mehta therefore recommends that the first step towards assisting the weaving industry should take the form of a well directed effort to improve their economic position. He would form associations or societies of weavers using their joint credit to purchase yarn on favourable terms, to maintain warping factories producing yarn beams for the member's looms, and to purchase improved looms for the weavers when such are in the market. His Excellency the Governor in Council is prepared to accept these conclusions. He recognizes that, as in the case of the premier industry, agriculture, no real improvement can take place in the condition of the weavers, who with their dependents number over 300,000

in this Presidency, until they have been instructed in the proper use of their joint credit, and have learnt the advantages to be gained by co-operation.

4. To this end, it is essential that the economic aspect of the question should take precedence over the technical. The pursuance of the methods which have shown considerable promise in inducing agriculturists to combine and utilize their joint credit, that is to say, the adoption of the Co-operative Credit Society's principles and organization in the weaving industry must be entrusted to the Registrar of these Societies, assisted for the special purpose of the weaving societies by an expert assistant and adviser. Some experimental Co-operative Weaving Societies, under the direction of the Registrar, are already in operation such as the Sholapur, Ratnagiri, Dharwar and Gadag-Bettigeri Societies, and hold out promise of useful results. Progress would, however, be facilitated by appointing a technical expert to the Registrar's staff for the guidance of such societies.

5. His Excellency the Governor in Council proposes, therefore, as a first step in the improvement of the hand weaving industry of the Presidency to appoint an assistant to the Registrar for a period of three years. It will be his function to assist and advise the Registrar of Co-operative Credit Societies in creating such societies among the hand weavers of the Presidency in order that they may be relieved from the disadvantageous economic position in which they now are, and may proceed to adopt the improved methods of production, by the erection of warping factories, the purchase of improved looms, and the sale, at more favourable prices, of their cloth, as proposed by Mr. Mehta in the body of his report. Progress must necessarily be slow; but His Excellency the Governor in Council believes that it is more likely to ensue, by following the scheme now sanctioned, than by the purchase and distribution to weavers, either by Government or local bodies, of improved looms

and other appliances, such as are from time to time brought to the notice of Government for their patronage. With the improvement in the financial position of the weavers by the operations of Co-operative Credit Societies the way will be open to the adoption of the improved methods and implements recommended by Mr. Mehta in Part II of his Report, in such circumstances as to secure to the worker the full profits earned by his skill and industry. His Excellency the Governor in Council believes that upon the lines now laid down valuable assistance can be given to the hand weaving industry of the Presidency which the Government is anxious to assist.

(Sd.) R. E. ENTHOVEN,
Secretary to Government

REPORT ON THE HAND LOOM INDUSTRY.

CONDITION OF THE HAND LOOM WEAVERS.

A general survey may now be taken of the state of the hand loom weavers who are to be found in this Presidency. They may be divided into four classes, according to their status and condition of life, and according to their ability to finance the buying of yarn and selling of the cloth that they turn out.

Firstly.—There is a class of weavers who are more or less Sowkars. They can afford to buy yarns in quantity, and to hold a small stock of manufactured goods. They and all the members of their family are occupied in preparing yarns and weaving cloth, and in addition, they have under them weavers who work for them on wages. Some of these Sowkar weavers also deal in yarns and often lend yarns to other weavers at advantageous prices to themselves, arranging to buy the woven cloth at rates barely sufficient to keep the weavers in wages.

The second class of weavers are those who are not in any Sowkar's debt and have a small sum of money to buy yarn. They generally do most of the preparing of warps and weaving themselves. They fare well in good times, but in slack seasons and bad times their staying power is weakened. They cannot afford to keep their production for any length of time, and must sell at a sacrifice, even of part of their labour-wages. They are often compelled to take yarns on loan to keep them going. They thus fall into straitened circumstances.

The third class of weavers are those who have contracted a debt from a Weaving Sowkar and who have pledged their looms which they work for him on wages till their debt is paid. They weave in their own houses, and in good times, when the demand for manufactured articles is brisk, they are often tempted to get a loan from some other person and thus try to deal with more than one Sowkar on the sly.

The fourth class of weaver is hopelessly in the debt of the Sowkars. He has often no house of his own to live in. He goes to weave at the house of the Sowkar or at a place provided for him. He never can hope nor aspire to be a free man, and invariably dies a serf of the Sowkar after an existence of abject poverty.

Out of the total population of hand-loom weavers about 5 per cent. belong to the first class mentioned above and about 25 per cent., 50 per cent. and 20 per cent. belong to the 2nd, 3rd and 4th class, respectively. The financing capacity of the majority of these weavers is very limited. They invariably buy yarn in small quantities at retail prices, and often a bundle of yarn is given to them on credit at a duly increased price. When the weaver gets yarn on credit from a merchant who buys his cloth, the merchant who by experience knows exactly the quantity of yarn required for the cloth, adjusts the price of the yarn so as to leave hardly sufficient wages to the weaver and his family when payment for the cloth is made. The small buying power of such men does not permit of the manufacture of the goods on economic principles. It is grievous to find many weavers in the Deccan and other places procuring yarn sufficient only for the weaving of one saree. They and their family waste time in preparing such short warps and gaiting them up to the looms. The cloth is woven and the further work of preparing and weaving has to be stopped till the cloth is sold. The cloth has to be disposed of to make provision for the family and to buy a further supply of yarn with which to continue work. Only precarious wages could be earned by such a system. As previously pointed out some can afford to get sufficient yarns to prepare warps of 2, 3 or 4 saree lengths and have weft sufficient to weave cloth out of them. They are not much better off than their colleagues of humbler capacity. Their earnings are poor in the best of times. The cloth turned out is generally what their ancestors used to

weave, and is such as is locally saleable either to private individual customers or to the local dealers. Wasteful as are their manufacturing methods both in time, wages and material, they are worse off in selling their goods. They have to leave work and spend some hours in finding a suitable customer ; and failing to find one, they have to go to the local merchant who knows too well how they are situated and invariably strikes a bargain entirely in his own favour. The following instances are given from different towns of this Presidency to show the prices of yarn paid, the cost of manufacture for different processes, the wages earned, the time taken in the manufacture of goods, and the margin of profit left to the weavers who finance their trade. The selling prices given are what the weavers get in disposing of their goods to the local merchant.

EXAMPLE I.—DHULIA (MAHOMEDAN WEAVERS).

Cotton sarees made from 20s warp and 16s weft dyed in ordinary colours and 2/40s coloured cotton yarn in borders.

Particulars.—Warp for 12 sarees made consuming 10lbs. = 20 knots of 20s coloured yarn.

Twenty-five knots of yarn for weft for 12 sarees of 16s counts.

Rs. 2 worth of 2/40 coloured prepared yarn used in warp for 12 sarees.

Each saree of 16 hands length and $2\frac{1}{2}$ hands breadth. Yarn is sized in hanks.

	Rs.	A.	P.
Cost of sizing one bundle of 20 yarns ...	0	2	0
Cost of winding and warping 20 knots at 9 pies per knot ...	0	15	0
Cost of dressing, and pirning and weaving 12 sarees at 6 annas per saree ...	4	8	0
Total cost of 2/40 yarn for border for 12 sarees ...	2	0	0

	Rs.	A.	P.
Total cost of one bundle = 10lbs. of 20s			
coloured yarn	7	0	0
Total cost of 25 knots of 16s counts at			
Rs. 6-12-0 for 20 knots	8	7	0
	<hr/>		
Total cost of 12 sarees	23	0	0
	<hr/>		

Therefore the cost per piece is Rs. 1-14-6. Price realiseable is from Rs. 1-12-0 to Rs. 1-15-0, according as the time is favourable or otherwise and according as the work is good or slightly faulty.

It would take at least a fortnight to finish the work.

Note.—Excluding the cost of size ingredients, etc., the total wages earned by the weaver and his family together is 87 annas in 15 days = 5¾ annas per day approximately.

EXAMPLE II.—DHULIA (HINDU WEAVERS).

Gomikathi sarees with indigo ground and red cotton borders and silk palave.

Particulars.—6 sarees made from one bundle of 30s yarns dyed indigo using the same yarn both in warp and weft and 40s Turkey red yarn for the border.

	Rs.	A.	P.
Cost of one bundle of 30s counts dyed			
yarn	11	8	0
Cost of silk palave all charges included ...	1	0	0
Cost of 40s. counts Turkey red yarn for			
border	1	0	0
Preparation of warp and weft for 6 sarees			
including winding, warping, sizing,			
dressing, drawing in, etc.	3	0	0
Weaving and pirning charges for 6			
sarees	6	0	0
	<hr/>		
Total cost	22	8	0

In bad times these sarees are sold at Rs. 3-8-0 each but in seasons and good times they fetch a price up to Rs. 4 per saree.

The merchant supplies grey yarn which is locally dyed indigo. He also supplies the yarn for the border and the silk for the palave.

He buys up the cloth manufactured at Rs. 21 for 6 sarees though giving the weaver full credit for his wages the actual cost amounts to Rs. 22-8-0 for 6 sarees.

This shows how in unfavourable times the weaver gets less for his labour. In good times the above 6 sarees will fetch Rs. 23 to Rs. 24.

EXAMPLE III.—SINNAR (NASIK DISTRICT).

Checked sarees in 40s warp and weft Turkey red and 30s warp and weft dyed indigo black sarees $2\frac{1}{2}$ hands in width, 16 hands long.

Yarn consumed for 4 sarees—

3 $\frac{3}{4}$ lbs. of 40s Turkey red.

4 lbs. of 30s indigo black.

2 knots of 2/40s yellow and bleached used in border and palave.

	Rs.	A.	P.
Cost of 3 $\frac{3}{4}$ lbs. of 40s Turkey red yarn ...	4	5	0
Cost of 4lbs. of 30s. black yarn ...	4	3	0
Cost of 2 knots of yellow and bleached double yarns for warp and palave ...	0	14	0
Cost of winding, warping and sizing ...	1	4	0
Cost of dressing ...	0	8	0
Weaving charges for 4 sarees made out of this warp ...	2	10	0
Miscellaneous cost of healds, etc. ...	0	9	0
Total...	14	5	0

Price realised for 4 sarees is Rs. 15, also a small piece of cloth is left surplus above the 4 sarees of the value of about Re. 1.

It would take about 7 to 8 days to finish the work,

EXAMPLE IV. —ERANDOLE (NASIK DISTRICT).

Cotton bordered sarees with Gomikathi design in the border.

Counts.—30s warp and weft and 2/60s counts bleached yarn for design in the border.

Warp prepared for 3 saree lengths—

17½ knots of 30s counts yarn used for both warp and weft together.

½ knot of 2/60 bleached yarn used for border.

18 knots.

Out of these 9½ knots are used for warp and 8½ knots for weft.

	Rs.	A.	P.
Cost of winding and warping 9½ knots at 1 anna per knot	...	0	9 6
Cost of sizing and dressing 9½ knots at 1 anna per knot	...	0	9 6
Cost of drawing in	...	0	2 0
Cost of healds, etc. (taken in proportion)	0	4	0
Cost of pining 8½ knots at ½ anna per knot	...	6	4 3
Miscellaneous cost of oil, etc.	...	0	1 0
Cost of weaving three sarees	...	2	0 0
Cost of coloured yarn and warp and weft (red and yellow)	...	5	1 8
Cost of 2/60 bleached yarn	...	0	3 4
Total...		9	3 3

3 sarees sold at Rs. 3 each = money realised Rs. 9.

Note.—Sometimes the cost of pining is included in the weaving charges, in which case the cost will be decreased in the above figures to that extent.

EXAMPLE V.—DHOTI SUPERKATHI (ERANDOLE).

Cloth 2½ hands in width and 20 hands long per piece complete.

Warp prepared for 3 such pieces—

60s American yarn for warp and weft used. Yarn consumed—

14 knots of 60s counts yarn for warp.

1 knot of 2/60s counts yarn for borders.

16 knots of 60s counts yarn for weft.

	Rs.	A.	P.
Cost of winding 15 knots of yarn at 1 anna per knot	0	15	0
Cost of warping 15 knots of yarn at 1 anna per knot	0	15	0
Cost of sizing 15 knots of yarn at 1 anna per knot	0	15	0
Cost of dressing and drawing warp for 3 pieces	0	8	0
Cost of weaving 3 pieces including pirning	4	0	0
Cost of beads used (proportionate cost) ...	0	6	0
Sundry charges	0	2	0
Cost of 30 knots of 60s yarn	7	0	0
Cost of 1 knot of 2/60 yarn	0	5	0
Total...	15	2	6

Sale price for 3 pieces Rs. 12-2-6.

Loss in wages Rs. 3 on 3 pieces.

This means that out of the total of 117 annas that ought to be earned by the weaver and his family for weaving the abovementioned 3 pieces they actually get 69 annas only as wages.

It will take them nearly 12 to 15 days to finish preparing and weaving these pieces, hence the wages earned per day are not more than 5 to 6 annas per day.

Note.—In spite of the weaver's working at such a loss there is an extremely limited sale of such grey goods, for they come into direct competition with similar machine-made goods and compared with them their price is prohibitive.

EXAMPLE VI.—CASODA (ERANDOLE TALUKA)

Manufacture of "*Johra*" (white shetrangee).

The use of three folds of 6s counts cotton yarn for warp and 7 threads of 6 counts cotton yarn put together as a single pick of weft is made in manufacturing a "*Johra*."

Cost of manufacturing 1 piece—

	Rs.	A.	P.
5½ lbs. of 6 counts cotton yarn used at			
5 annas a lb. ..	1	11	6
Coloured yarn used for heading 2 tolas..	0	1	0
Winding of yarn at 2 annas a bundle ..	0	1	0
Warping of yarn at 2 annas a bundle ..	0	1	0
Weaving of the piece ..	0	7	0
Drawing in charges ..	0	0	6
Total cost price ...	2	6	0

Price realised Rs. 2-4-0 to Rs. 2-8-0.

Average price realised Rs. 2-6-0

Total wages earned by the weaver and his family per piece is Re. 0-9-6 and it takes them 2 to 3 days to finish one piece.

Note—There are about 100 looms weaving "*johra*" in Kasoda and about 300 Momils are employed for the purpose to prepare yarn and weave the fabric.

They are all in debt and Sowcars finance their buying and selling, and even cater to their domestic needs.

EXAMPLE VII.—PAROLA.

Natti saree 36" width + 14 hands length.

20s coloured yarn used for warp and weft with 26s counts.

Coloured yarns used for the borders.

Warp is prepared for 5 sarees.

Yarn consumed—

7½ knots of 20s counts for 5 sarees warp.

1½ knots of 26s counts for 5 sarees warp.

7½ knots of 20s counts for 5 sarees warp.

The yarn is locally dyed with German dyes (direct colours) at the rate of 12 annas per bundle of 17 lbs.—

	Rs.	A.	P.
Cost of winding, warping and sizing	0	6	0
Cost of pirning	0	2	0
Cost of dressing the warp	0	3	0
Cost of drawing in	0	1	0
Cost of healds which last for 5 sarees only	0	4	0
Weaving charges for 5 sarees	1	4	0
Cost of 20s coloured yarn	3	10	6
Cost of 26s coloured yarn	0	7	0
Miscellaneous charges of gum, etc. ...	0	2	0
Total cost for 5 sarees	6	7	6

Total amount realisable for 5 sarees Rs. 5-10-0.

Time taken to prepare and weave 5 sarees is about 8 to 9 days.

This means a loss of Re. 0-13-6 for 5 sarees ; hence out of the total wages of 32 annas, only about 19 annas are left in the hands of the weaver and his family and that for 8 days' work.

In good times when the demand for cloth is brisk Rs. 7-8-0 are realised for the above 5 sarees.

That means 48 annas available to the labourers= 6 annas per day doing the work in 8 days.

EXAMPLE VIII.—BROACH.

Manufacture of Sallas from 20s counts coloured warp and weft.

Warp of about 50 gajs is prepared to weave 4 Sallas out of it.

Yarns consumed—8 knots in warp.
6 knots in weft.

	RS.	A.	P.
Winding of 8 knots of 20s counts at $2\frac{1}{2}$ annas per 10 lbs.	0	2	0
Warping 8 knots of 20s yarn at 5 annas per 10 lbs.	0	4	0
Sizing, dressing, etc., of 8 knots at 8 annas per 10 lbs.	0	6	6
Weaving, etc., charges for Sallas	1	8	0
Cost of 14 knots of dyed yarn at 8 annas per lb.	3	8	0
Total cost ...	5	12	6

Price realised for four Sallas Rs. 6.

Such cloth is woven by Khatries, many of whom are in debt. They only weave for the Sowkars and have the warped yarn and weft supplied to them. Separate workers are employed to prepare warp and size and dress it.

EXAMPLE IX.—TANDO ALAHYAR (SIND).

Manufacture of coloured susies made from 40s counts cotton yarn dyed in fast colours of Turkey red, yellow, green, blue, etc.

Warp of 32 hands is prepared for one susie piece.

Consuming 9 knots of yarn 40s counts in warp.

Consuming 3 knots of yarn 40s counts in weft.

Altogether nearly 6 knots are of Turkey red colour and the rest in other colours.

	Rs.	A.	P.
Cost of winding and warping the above yarn	0	5	0
Cost of sizing	0	5	0
Cost of pirning weft	0	2	0
Cost of 6 knots of 40s. T. red yarn	1	13	0
Cost of 6 knots of 40s. coloured yarn	1	9	0
Total preparing cost and cost of yarn	4	2	0

				Rs.	A.	P.
Price realised for one piece	...	...	...	6	0	0

Money left in the hands of the weaver who does the buying with cash and prepares the warp and weaves the cloth himself. He sells locally and can afford to wait customers.

1 14 0

This work is generally finished in three days. There is always a good demand for susies and similar manufactured goods in Sind.

For the requirements of this report the above nine examples may suffice to illustrate the scale of wages earned, the cost of production, profit left in the transaction, etc.

As previously mentioned, the earnings of the weaver are dependent upon the demand for cloth and on his financing capacity. If he is in debt he can only aspire to earn living wages in the best of times, and must be prepared to fare ill in adverse times.

Example V serves to show that there is no scope for the hand-loom weaver to enter into competition with the power loom in the manufacture of plain grey goods such as dhoties, etc., in this Presidency. It is only in the production of sarees, susies, khesh, cholikunds, etc, which do not lend themselves easily to power loom weaving, that the hand-looms can hold their own.

In the Central and Southern Divisions of this Presidency, the hand loom weavers are mostly occupied in weaving coloured goods, to be worn by males and females. They all try to work on the artisan system and to earn a livelihood independently, working in their own houses ; but their slow and uneconomical system of manufacture, domestic misfortunes, bad seasons and famine conditions gradually drag them down from independence to indebtedness, and from indebtedness to serfdom under the clutches of Sowkars. The majority of the

weavers buy yarns retail, and hence at the highest possible prices ; they manufacture their goods in the slowest possible way, and try to sell them to local buyers and merchants of whom the latter are too clever for them. They are at a disadvantage in the best of times, realising the lowest possible prices for their manufactured goods.

In the manufacture of 'silk goods the weavers are too poor to finance the buying of yarns and the production and selling of cloth. So most of the silk weavers work on domestic system. *i. e.*, they are provided with warp and weft and weave the goods in their own houses, or sometimes in the house of their employers, on piece-work. The evil of this system is that the weaver is tempted to take an advance of money to be engaged to weave for an employer for say a period of one year. The money is soon spent on some domestic objects, such as death, marriage, etc. The work is done so slowly and the wages earned are so cut, that it is not possible for the weaver to return the loan at the end of the year. Once the debt is contracted, therefore, the weaver is likely to remain for ever in a state of want and dependence.

The Khatris (a class of weavers) in the Northern Division engaged on cotton goods manufacture in Broach, Surat and other towns, are examples of weavers working under this sweating system.

Dhedias and other low class Hindus in this Presidency, weaving a very coarse quality of cloth, can hardly be called hereditary weavers. They do not permanently belong to the weaving trade and only earn a precarious living.

Better class weavers in the Northern Division are engaged on silk cloth manufacture and working on the domestic system, fare well, or ill according to the demand for the manufactured goods they are interested in.

All weavers working on the artisan system are more or less connected with the soil, and have some interest in agricultural besides weaving. Very few weavers working

on the domestic system of manufacture can be found who own land or are connected with the soil. In the Central, Southern and Northern Divisions of this Presidency, the harvest is dependent upon climatic conditions, and the prosperity of the handweaving trade is affected correspondingly.

In Sind the weaving population is better off than their brethren of other divisions. They are all more or less independent of the money lenders. They can finance their trade and can afford to await the customer. Irrigation Works have rendered the harvest condition steady, and hence the buying power of the ryots there is generally normal. In fact the hand-loom weavers in Sind cannot weave sufficient cloth to meet the demand of trade. It is difficult to get a man to work a loom as it pays the labourers better to work in the fields; and there is a steady demand for labourers for such work.

Speaking generally then, the state of hand-loom weavers is far from satisfactory. The state of being constantly in want and dependence, kills all enterprise and activity in them. This coupled with ignorance of any improved system of manufacture and the want of even primary education helps to make them what they appear to some, *i. e.*, indolent, lazy, dissipated and extravagant. They may be all that they are represented to be, but they are mere creatures of circumstances. It appears that the national caste system of the Hindus has reflected its effects on this industry.

A class of trading sowkars, a class of sowkar weavers, a class of weavers of ordinary means, and a class of weavers who are for all practical purposes serfs to the sowkars, have come into being. A common tie of interest has linked these classes together and each one depended upon the other to fulfil the requirements of the trade, so much so that an ordinary weaver does not think himself called upon to ascertain where his goods are sold or how he should vary his style of manufacture. The

Sowkars on the other hand have a monopoly of the trade, and they are content to expand the scope of their work to the extent of their financing capacity, and in accordance with their idea and aspirations for the augmentation of their trade. Perhaps that was the natural outcome of the conditions that prevailed in India before the importing of machine-made goods in the land. Every village, every town, every district and every province was self-contained in catering to the wants of its people. There practically was no competition between village and village, town and town, district and district, and much less so between province and province. A spirit of assurance prevailed which brought about a stagnation in the methods of manufacture. If the product of one province was brought to another it was more as a matter of luxury or novelty than for economic reasons. But with the advent of foreign machine-made piece-goods, a remarkable change came over this trade. New tastes and wants were created, and Indian hand-made goods began to be sold for garments peculiar to some communities or castes and for such, as cannot conveniently be manufactured in factories. Fortunately the increase of intercommunication facilitated by Railways, the increase of population caused by the establishment of peace in the land, and the increased demand for piece-goods due to these and numerous other causes have checked the decline in the hand-loom industry. Again, the more intelligent class of merchants realising the possibility of machine-made piece-goods have devoted themselves to the development of the same, leaving some of their colleagues to deal in hand-made goods in the old way. A merchant of the latter class deals with about 50 to 100 weavers. He has the destiny of these weavers in his hands. He has advanced them money and tied them down to work for him. He has connections in that or in the neighbouring district, and tries to increase his production or curtail it according to the demand from his constituents. He generally deals in the same varieties of cloth.

He neither inspires nor encourages the weaving of cloth in new styles and finishes. His knowledge of the manufacturing art is limited to knowing how little yarn is required to weave a particular fabric, and in calculating how little to give to the weaver to keep him permanently working for him. The sons of such Sowkars get the necessary training, learn to read and write and to keep accounts, and apprentice themselves to the trade of their parents from youth, assimilating all their business tactics but never trying to acquire an insight into improved modes of manufacture.

Perhaps they do not feel it necessary to put themselves to the trouble of improving the system of manufacture or think it to their interest to improve the lot of weavers working under them. A handful of them control the lot of many weavers, and the trade being conducted almost entirely in this one-sided way, they contrive to have enough for themselves under any circumstances, and pay very little attention to the future of this industry. Thus, as slack seasons, famine conditions, and similar adverse conditions are not uncommon in India, as the knowledge of the weavers is exceedingly limited in producing new and original patterns, styles, finishes, etc., and as the selling and the distributing of the goods is confined to the hands of the smallest possible number of men, who can hardly boast of much better knowledge in the production of articles than the workers, nor possess any remarkable degree of trade, ability and enterprise, the market for those hand-made piece-goods which are typical in their style and have a peculiarity of their own, is limited and does not expand. This opens up the question of the general state of the hand-loom industry.

THE STATE OF THE HAND-LOOM INDUSTRY.

In the absence of exact figures showing the number of hand-looms working in this Presidency now and some time back, and in the absence of comparative statements

showing the total production of cloth by hand-looms now and some years ago, it is only by the study of other factors that the condition of this industry can be ascertained. In the first place, the very fact that hand-loom weaving has survived the severe competition of machine-made goods of foreign countries highly advanced in the art of textile manufacture for a protracted period of several decades, helps to give an idea of the hold this industry has over the people of this country, due to the special quality, style and nature of its manufacture. It is reported that the hand-looms produce double the quantity of cloth compared with the production of power looms in this country; and this is very significant when it is remembered that the weaving mills here either good, bad and indifferently managed as they may be, have so far on an average yielded handsome profits on the invested capital. It is estimated that 2,318 million yards of cloth were imported into India in the year 1906-07, and about 579 million yards were manufactured in the country itself. Part of these manufactured goods was exported to Aden, Massowa, and other places. However, taking these exports to be insignificant, the total cloth available in India to be consumed by 300 million people per year is about 2,897 million yards. This does not give an average of even 10 yards per head per year. Taking into consideration, the nature and quality of cloths imported and manufactured in India, 19 yards would hardly fit a person out with one complete suit of garments. Again knowing that there are several million people in India who are barely half clad, it naturally follows that India does not as yet buy as much as a civilised nation would buy, looking to the present day requirements. India does not buy enough clothing because the majority of its people have not enough money to do so, after providing themselves with sufficient food. However, with the increase of industrial concerns, opening up of Railway works, Canal works, and other Construction works people begin to earn more

and utilise their earnings for food and for clothing, which they buy in increasing quantities every year together with other necessities of life. India affords a virgin field for the expansion of such industrial and economical enterprises, and these enterprises will lead to an increased demand in India for clothing, which the people will buy as much as they possibly can from the country, and the rest *they will have to buy* from outside. Hand-loom industry will thus have its share of the increased demand, and, if an economical system of conducting this industry, can be established, it may lead to better earnings for the operatives, besides gradually educating them to a higher system of manufacture and making them more enlightened citizens in the end.

As previously shewn, in spite of the increased capacity of this Presidency for the spinning of coarse and medium counts of cotton yarns and in spite of the facilities in India for dyeing textile fabrics, the imports of English grey yarn and some qualities of coloured yarns have not shewn any decrease. It may be safe to assume then that, if the hand-loom weaving industry has not increased, it certainly cannot have greatly declined. It is true that, owing to the unscientific way of manufacture and owing to the uncommercial system adopted in this industry, the people engaged therein are not in any enviable condition of life. It may be asked—why do the people stick to this industry and not take to do better paid work in the fields, in construction works, in workshops and in factories? The reply is not difficult to give. In the first place, the artisan system of work has its flavour of independence and ease which appeals very strongly to human nature. Again, the state of living in constant want, and in frequent voluntary or compulsory idleness due to the fluctuations in this industry, has brought about physical deterioration in the workmen, and has engendered in them a habit of indolence and indifference which makes them utterly unfit for other laborious and disciplinary work.

The facts further suggest for consideration that, if the hand-loom industry (uneconomically conducted as it is from the technical point of view) has yet survived this age of speedy production (when anything done by crude manual labour is doomed to die), can it not hope for a better future if it can be made to assimilate a more scientific system of manufacture and a more concentrated and developed system of trade? It is true that the hand-loom manufactures of European countries are dying out very rapidly, and countries which are destitute of coal and iron industry are the only places where hand-loom and handicraft methods are in vogue. However, the case of India is very different. It is essentially an agricultural country. Agriculture leaves to some portion of the population time enough at their disposal to do handicraft work, such as hand-weaving, etc. In short, owing to the uneconomical distribution of labour, owing to the social restrictions of these workers, and owing to the general want of proper knowledge and organized capital, the hand-loom industry will long remain in India, till a time is reached when India possesses suitable conditions, both of capital and labour, to totally supplant this industry with power machinery, and even then the hand-looms will have to be worked though confined to certain classes of goods only.

To sum up then, the chief drawbacks in the time-worn system of conducting the hand-loom industry are—the slow and costly preparation of the warp, the slow and wasteful method of stretching the warp in front of the loom, the weaving with a primitive loom, and finally the uncommercial way of buying yarns and selling the woven fabrics.

REORGANIZATION OF HAND-LOOM INDUSTRY.

The task of reorganizing the hand-loom industry, in order to remove the various drawbacks previously mentioned, will have to be undertaken from various quarters if this industry is to be put in a satisfactory state.

The changes should not be very radical in their character. An improved loom appears to be the cry from the various quarters in which endeavours are made to improve the lot of these poor weavers. The question of improved supply of warp will have to be solved first, to justify a demand for the supply of improved looms. As an improved loom to suit the requirements of the majority of weavers *in this Presidency* is not in the market, it is desirable to see how to utilize the existing implements to the greatest advantage.

The old hand-loom is in the possession of the poorest weaver and it is capable of weaving anything that human skill can think of. If this loom is supplied with long well-made warp properly wound on a wooden roller, and the latter properly mounted on supports and suitably weighted, the weaver will be able to increase his outturn to nearly 20 per cent., doing his work in the usual way. The weaver will thereby be enabled to do the work of weaving continuously, and all the detentions incidental to the use of short-stretched warp are avoided. To use a warp beam in conjunction with the ordinary primitive pit-loom does not demand any special skill nor expense worth mentioning. All that the weaver is required to do is to dig a small pit about a couple of yards away from the pit he is sitting in to suitably accommodate the yarn beams on supports so that the warp may be very nearly in a line with the cloth roller of the weaver. The tensioning of the warp is the essential feature of this arrangement, and the weighting of the beam for the purpose may be of the types shewn in the sketches (Figures, V, VI and VII).

Thus, the first thing to be done is to endeavour to solve the problem of preparing the warp—either of cotton, silk, etc. Just as the weaver buys yarn in bundles, let it be made worth his while to buy yarns sized, dressed and arranged in the required order for a desired pattern, wound on a wooden roller in portable quantities. It is now an established fact that the handloom

weaver using any style of loom—either old or new—can weave very well from a roller beam, provided that the yarn beam is well filled, and is suitably mounted, and the warp properly and elastically tensioned.

The use of the yarn roller beam offers great advantages because it enables long lengths of warp to be used besides permitting the yarn to be wound straight and in an unentangled condition, thus facilitating the continuous weaving of the cloth and saving much waste of material, loss of time, labour and wages for frequent dressing, drawing in, or twisting in of warps and gaiting the same on the looms. The old style of loop holds should be discarded in favour of those with a central eye to support, the threads and not to nip them tight, and the latter should be made from better material to make them last longer and be used over and over again for a reasonable length of time.

The use of yarn roller beams should naturally lead to the use of winding and warping machines. The sizing might be done by hand or by machine before the winding of yarn or after the warping of the same as it may suit the requirements of the case. A beaming apparatus is required in addition to winding and warping machines, and the proper use of this machine will ensure the successful working of the yarn in the looms. Of course, one weaver cannot afford to have all these machines for himself, and he should not have them, as they are too much for his small requirements. They should be adopted by a yarn merchant who caters for many weavers and who could afford to invest about Rs. 2,000 for the purpose. Now, the use of these machines cheapens the cost of production to the extent that, where it costs Re. 1 to prepare a certain warp in a particular quantity by the usual hand process, the cost will be annas 5 to 6 if the same be prepared by the machinery mentioned above. Of course, all the gain should not go to the pocket of the merchant. He must share the difference with the weaver, because the latter, while using ready-made warps, loses the wages

(however meagre) that should have been earned by the females and children in his family. The importance of this will have to be realized by the merchant, for he cannot successfully sell prepared warp until he makes it worth while for the weaver to buy it. The females can utilize their time in the more remunerative work of weaving cloth in their own houses, or some of them may work at the winding, etc., machines at the merchants'. The use of roller beams will allow the weaver to accommodate four looms in place of two and he may even have more if he cares to. The system of weaving, with the old pit-loom, cloth from beamed warp will gradually educate the weaver to the use of still better and speedier methods of manufacture, and it may not be long before he realizes the advisability of having a fly-shuttle drop-box loom or an automatic drop-box loom with dobby attachment if he can find means to do so.

The cheapening of the cost of preparing will certainly lead to larger sale of the goods manufactured, and that should afford better chances of finding continuous work to the weaving population than they now have.

Now, the advantage of the cheaper cost of preparing yarn should better be taken advantage of by the weavers themselves on a co-operative basis.

CO-OPERATIVE SYSTEM OF WORKING.

A caste of weavers, or a locality of weavers, or weavers manufacturing similar type of goods, should combine together and form a co-operative society and have a common warp preparing depot of their own.

Collectively they may buy yarn and buy cheaply. They may get the warps prepared for them or sold to them at rates adjusted and fixed by themselves. They may have a common shop for disposing of their goods, and will then not have to depend upon local merchants, who invariably prey on them. Collectively they can afford to open new connections in various towns of this or other

Presidencies, and thus to secure orders or dispose of their goods to advantage. Collectively they have a credit and so can procure the use of money at a reasonable rate of interest, and hence in slack season they may at least be able to keep all their looms going and get reasonable wages without being driven to incur debt to maintain themselves.

Collectively they can afford to buy samples of improved looms and test their utility for general or for particular styles of weaving; and resting on such practical demonstration, they will be able to judge which loom is useful to them to suit their requirements. When funds permit, and weavers desire, looms may be loaned out to them on the instalment system of payment, on a similar principle to that of Singer's Sewing Machines amongst the tailors. Collectively they can procure looms from the makers on an instalment system and thus gradually benefit themselves and earn better wages. Hence they will come to a better style of living, and thus they will educate themselves to be intelligent citizens, capable of guarding their own interest and of forming themselves into a self-governing body of industrial people.

There is an advantage worth mentioning in connection with the system of specialising the preparation of the warp. This is, that very young children who are now made to do the work of winding, warping, pirning, etc., will be free to go to school and thus to equip themselves with knowledge useful for sharing in the work of earning a living.

How these societies can be organized will have to be ascertained by the study of the needs of the people and the nature of the circumstances prevailing at different centres of this industry. Such societies should not be forced on the people, but the people should be taught to form them. A successful working of one such society will stimulate the formation of others. The general body of weavers in a

village or a town know one another, and they know how much one of them really requires and how a loan given should be best spent ; besides being conjointly responsible for one another they will see that each of them fulfils his part of the obligation incurred.

Such a weaver's co-operative credit society should be a self-governing organization having a general assembly, a committee of supervision appointed by the society, to actually direct operative work and to determine all points incidental to the conduct of the work of the society. The smaller committee of directors must be helped by an efficient paid manager or an accountant. The chief functions of such an organization should be :—

(a) To determine the quality and quantity of yarn generally required by its members and to arrange to buy the same at cheap wholesale prices and to keep a reasonable stock of the same.

(b) To supply yarns to the members on cash payments and to grant loans of the same as required in small or large quantities on easy terms, chiefly on the personal securities of two members of the society.

(c) When funds are available, a beginning may be made with a small warp and weft preparing depôt, and prepared warp wound on beams and weft wound on spools should be sold to members. This will serve a double purpose—

Firstly.—It will greatly cheapen the cost of preparation of the warp. The society can divide the profit between the society as a whole and the member using the same.

Secondly.—Some remunerative work will be found for the females and grown up children of the members at the machines in the depôt.

(d) To open a shop for the benefit of the members

to which they can send their cloth to be sold and whence they may get money on account.

(e) To grant loans of small or large sums on easy terms as required, chiefly on the personal securities of two members of the society. Absolute security of repayment must be looked to.

(f) To insist that the loans are properly spent—on buying yarn or other materials required for the manufacture of cloth from or through the society, or in buying approved implements of manufacture.

(g) To aim at coming closely in touch with the day-to-day requirements of the weavers and, when funds permit, to look even to their domestic wants, so that they may not be driven into the clutches of the *savkars*.

(h) To aim at improving the moral and material state of its members; only men of thoroughly good character should be enlisted as members of the society, and a drinker, a spendthrift, a gambler, etc., should not be taken as a member even if he be a rich man.

Such a society should be worked on the fundamental principle of unlimited liability. It should not be very large. An average membership of about 100 to 200 weavers is preferable. The notion of self-help must be *instilled into the minds of the weavers, and for that reason they must be encouraged to offer sums of at least Rs. 5 and upwards, as their share in the formation of these societies.* Those who have no means to subscribe must be given money on the *tagavi* system, or such a loan may be procured for them from some Central Bank established to help the co-operative credit societies of all descriptions in the country. This loan would be deposited in the society and would entitle the borrower to the purchase of yarn, etc., from or through the society to weave cloth which he would bring to the society's shop for sale. The loan above referred to must be recovered in part at every transaction, in very small proportions.

For example, suppose a man is given a loan of

Rs. 10. He puts that money into the society's fund in order to become a member, and in return he can immediately get from the society the required yarn to the value of about Rs. 10. This yarn, when turned into cloth, is generally valued at the least at Rs. 20, and even up to Rs. 25. This he delivers to the society's shop to be sold for him and he receives money on account, part of which he utilizes to buy a fresh supply of yarns, and the rest he keeps with himself to maintain himself and his family. This transaction would generally take place, say, once a fortnight, and if every time this is done, $\frac{1}{4}$ anna in a rupee is deducted from the sale-price of the goods, he would pay back, say, 5 annas, equal to $5 \times 26 = 130$ annas or Rs. 8 approximately per year. Thus, the loan of Rs. 10 can be recovered within 2 years without the least hardship to the weaver. To-day any ordinary weaver buying yarn in retail has to pay at least one anna in the rupee more than the cost price as the profit for the merchant, and to cover the risk, the merchant charges still more if the yarn is given on credit. This extra charge is saved if he buys from the society. Again, an ordinary weaver working on his own, while disposing of his manufactured goods, is usually paid from one anna to over two annas in the rupee less by the buying merchant than what the actual selling price should be. This loss would be obviated by the society's work, for the society subsequently gives him credit for the actual value realized for his goods, besides being able to sell the same at an advantage. As a matter of fact, the society as a whole can even enter into a contract for forward deliveries with a district dealer at certain fixed prices, and immediately can cover yarns against this contract to that amount, thereby ensuring profitable work for some of its members for that period. Once such a society establishes its credit for a regular supply of good, merchants from different towns, districts and even other provinces will themselves approach the society to buy cloth from them, and submit samples for the purpose.

The working of such a society once formed is a matter of detail to be worked out to suit the requirements of the case. Briefly then, the assembly of weavers may select about 5 men from amongst themselves to form into a working committee, who could ascertain their needs in regard to buying yarns, regulate the preparation of their warps, direct the selling of their cloth and regulate the granting of loans. This committee may be further helped by a couple of merchant members of the association, who should also have an interest in the profits of the association. The money of the association may be deposited with a reliable *savkar* or a bank, who could advance them money on goods when they may have to stock cloth or buy yarns for stock, at suitable prices. Government can safeguard its interest in cases where it has advanced money on small interest and given *tagavi* to weavers, by nominating a couple of members on the committee, and appointing auditors to regulate the keeping of accounts. There should be a minimum of red tape in the working of the committee, and it should be free to work on its own initiative. The guiding principle of the weaving public should now be to produce what is saleable and not want to sell what they usually produce.

To bring about such co-operation amongst the mass of weavers and to enable and encourage them to participate in the working of such societies, Government may provide *pecuniary* as well as *legislative* help.

Pecuniary help will consist in granting *tagavi* or lending small sums of moneys to individual weavers or artisans with the specific object of inducing them to join a co-operative society. Further, Government can help such societies as a whole by granting them a loan of money, say a sum equal to what they can get subscribed amongst themselves, at a small rate of interest, to be returnable after a certain number of years, say after 6 years. The society can arrange to recoup such a loan by charging say $\frac{1}{2}$ or $\frac{1}{16}$ of an anna per rupee on every transaction in the buying of yarn

or selling of cloth for the members: Such an additional charge of not even $\frac{1}{2}$ per cent. per every 100 rupees transaction in buying and selling will not be appreciably felt by the weavers for the reasons already stated. If such a turn-over of 100 rupees takes place once in a fortnight in the buying of yarns, the corresponding turn-over in cloth for the same period will be nearly Rs. 200. This will yield nearly 1 to $1\frac{1}{2}$ per cent. in a fortnight on the original Rs. 100 and subsequently amount to $1 \times 26 = 26$ per cent. per annum. So, within a few years, the loan may be paid back with interest.

Before considering the nature of legislative help to be given to these weavers it must be pointed out that there are some weavers who, through some cause or other, have incurred debt to a *savkar* interested in cloth manufacture, who in return for his loan makes those weavers weave cloth for him on the domestic system. He provides warp and weft yarns and gives them just sufficient wages to keep their body and soul together. Once the weavers get into the clutches of the *savkars* it is very rare for them to again be free to trade on their own account. Whatever may be the cause of the existence of such serfdom amongst the weavers, it is imperative, both for the industrial development of this country as well as for the amelioration of their condition, that such practices should be discouraged, and, whenever possible, gradually and very carefully put down with a firm hand. Now, for example, a case of a weaver may be taken who has borrowed, say Rs. 100, from a *savkar* and works for him, getting at the most, say, 3 or 4 annas wages a day. The rates of wages are exceptionally low in such cases, and, low as they are, they see a lower level yet in what are called bad times, when the sale of cloth is very restricted through famine conditions, slack season, etc. The weaver cannot possibly maintain himself and family on such wages and pay rent for the house he lives in, if it does not belong to him.

If such a man seeks the help of the society and

wants to be a member, then, if he is eligible in all other respects, the society may automatically refer his case to an honorary Arbitration Court where his real debt may be ascertained, and instalments fixed for the re-payment of his debt from his earnings through the society. This should be done at a trifling cost without Court-fees, etc., nor should any pleaders be required for the purpose. The weavers may further be advanced a small sum of money, say Rs. 10 or so, as *tagavi*, to become a member of the society, and from his earnings his debt may be paid off through the society, so that in due course he may be free. All his weaving implements must be exempted from attachment against any action brought by the *savkars* to recover the debt. Of course, the debt of the *savkar* must be fully honoured to the extent of the sum of money actually borrowed.

Generally in such cases no interest is charged on the loans by the *savkars* but the rates of wages are so fixed as to make up for this deficiency. The *savkar* also has the advantage of getting cloth advantageously woven for him, and sold at a profit.

Before closing this subject, the importance of the case may justify repetition of the statement that, as far as possible, a perfect system of self-help must be maintained in the working of such weavers' co-operative society. A weaver should only be allowed the benefit of the society when he deposits or gets some money deposited for him in the funds of the society, and then too he can be given yarns on credit aggregating in value to the extent of his deposit only. He may be free to sell his production elsewhere if he is not in debt, but in case he does not get yarn again from the society until he pays for it in full. So again in the case of co-operative societies, it may be better to advance them as much money as they have subscribed themselves, and further loans should only be issued to them after they have submitted proposals for the disbursing of the same. These proposals

should be approved by a competent authority well versed in textile as well as commercial matters, to be appointed by the Government for the whole of this Presidency to direct and supervise all the different organizations that the Government may be pleased to promote and encourage for the improvement of the hand-loom industry.

Educational help.—Government may give educational help to the hand-loom industry by establishing a Central Industrial Institute at Poona, Belgaum or at such other important centre of hand-loom weaving, where on a small commercial scale, the actual buying of yarns, preparation of warps and wefts, weaving of cloth and the selling of manufactured goods may be done. The students may be given a thorough insight into the theory and practice of technically and commercially conducting the hand-loom industry. The Institute may be provided with different types of winding, warping, sizing, dyeing, dressing and weaving machines suitable for this industry, and by making the student actually work on each of these machines for a definite period of time, a thorough knowledge may be imparted to him of the method of working different machines and their adaptibility to different kinds of work required. In this Institute any new type of loom or preparatory machinery offered for the use of the hand-loom weavers may be systematically tested and tried by actual use, and if possible a report of such trials may be published for the benefit of the buying public. At several places in this Presidency it has been found that enthusiastic persons have bought what they understood to be improved machines for either weaving or preparing yarns and subsequently have found that either those machines were not suitable for their style of work or that the machines were not what they claimed to be. A spirit of enterprise is very rare in India, and a couple of failures is sufficient to damp or kill the desire of many for the adoption of productive implements.

This Institute may subsequently provide qualified

persons to take charge of smaller industrial schools established in different towns and villages by the Local Boards or the Municipalities there and help to diffuse a knowledge of the economical system of manufacture with the help of improved methods and machines.

Every important village or a town of hand-loom weavers must have a school to give primary education to the children of weavers for at least, on an average, 2 to 3 hours a day, and simultaneously the children may be taught and made to work on improved winding, warping and pirning machines for the rest of the day. Children above the age of 9 years should be actually paid for the work they do during the time they are engaged on the machines. The machines may be driven by hand only. The children are already doing such work at their parents,' and they will very readily adapt themselves to the use of machines for the same work they are accustomed to do by hand at home. The system of paying the children for their share of work is essential to the success of such an enterprise, for it would encourage parents to send their children to school, while at the same time stimulating their young minds to the assimilation of a scientific system of work. Children above the age of 13 may be made to work on sizing, dressing, weaving, etc., machines of different types, and should be paid by the amount of useful work they do, after having learnt how to work the machine they are required to attend. It is very essential that the habit of doing good and correct work should be instilled into their young minds, and the system of paying for work done will certainly help to that end. Such an industrial school, once established, need not be a drag on the resources of the Local Board or the Municipality of a district, town or a village, whatever it may be. The technical portion of the school may almost pay for its maintenance, and the total outlay for that purpose need not be more than Rs. 5,000. The following figures are

given to give some idea of the practicability of such an undertaking.

Machines required.

One drum winding machine of 40 bobbins to wind grey or coloured yarn from hanks or cops at Rs. 400 in Bombay approximately.

One mill warping machine to warp yarn wound by the above machine at Rs. 450 in Bombay approximately.

One pirning machine to wind 12 pirns at a time from hanks, cops or bobbins at Rs. 200 in Bombay approximately.

One sizing machine to size hanks or ball warps at Rs. 125 in Bombay approximately.

One dressing machine to beam warps for the looms at Rs. 130 in Bombay approximately.

Six pit-looms as used by hand-loom weavers at Rs. 60 approximately.

Three fly-shuttle slay pit-looms at Rs. 45 approximately.

The fly-shuttle frame looms with drop-box arrangement, if procurable, at Rs. 300 approximately.

Six other improved looms, *e.g.*, Salvation Army loom, Hatterslay's loom, Sayaji loom, Mr. Churchill's looms and others at a total cost of about Rs. 700 approximately.

For the purchase of other miscellaneous articles of use—about Rs. 90.

Total investment in machines Rs. 2,500.

About an equivalent sum may be spent in providing a shed to accommodate these machines.

The preparatory machines enumerated above are quite enough to wind, warp, size, dress, etc., about 60 lbs. of 30s. warp a day. This group of machines will be found equally useful in a small warp preparing depôt established, say, by a yarn merchant or for the benefit of a weaving

workshop. Now the cost of production using adult workmen would approximate as follows:—

Five women attend to 40 bobbins in the winding frame and wind, say, only 40 lbs., earning about 4 annas a day each. Total cost of winding 20 annas.

The cost of winding 40 lbs. of yarn at 20 annas = $\frac{1}{2}$ per lb.

(The winders turn the machine by turns for about half an hour at a time.)

One man can warp the above 40 lbs. of yarns on the mill warping and get a wages of, say, 10 annas per day, so the cost of production would be $\frac{1}{4}$ anna per lb.

One man can dress and beam the above quantity per day at 10 annas a day = $\frac{1}{4}$ anna per lb.

Total cost of winding, warping and dressing 40 lbs. of 30 yarns will be 40 annas = 1 anna per lb.

The corresponding cost by the present day hand process would be—

$\frac{1}{4}$ anna per knot for winding 30s. yarns = $\frac{3}{4}$ anna.

$\frac{1}{4}$ anna per knot for warping „ „ $\frac{3}{4}$ „

$\frac{1}{2}$ anna per knot for dressing „ „ $1\frac{1}{2}$ „

Total cost of 120 annas at annas —

3 per lb. —

Thus making a saving of nearly Rs. 5 per day for that amount of work, besides affording good wages to some work people.

Now in the case of such a combination of machines used in connection with an industrial school, the work of winding and pirning may be got done by a group of small boys.

A group of bigger boys may be made to warp in turns. Bigger or better trained boys may be made to do the sizing, dressing and beaming. Finally the boys may be apprenticed to learn the art of weaving various styles of cloth on different styles of looms, thus familiarising them with the adaptability of various machines for particular types of work. Warps prepared in

the school may be partly utilized on the looms of the school, and the rest sold to the weavers of the locality.

The man in charge of such an industrial school must be a qualified man. A passed textile student of the Victoria Jubilee Technical School, Bombay, after receiving further instructions from the Central Industrial Institute already referred to, for about six months to a year, in the needs of this industry, may be found eligible for such an appointment.

It is essential that, whatever the size and number of such industrial institutes may be, they must all be conducted on practical commercial bases, and not for pure philanthropy. A couple of weaving schools have been started in this Presidency, and they have failed to fulfil the aim of their promoters, for the simple reason that technical knowledge and regard for the commercial needs were sadly wanting in their management.

It is not enough that a benefactor should give a handsome sum of money for the establishment of such an industrial school and then leave it to be managed by other people, mostly unskilled in the art of weaving, and whose only qualification for the directorship of such a concern is their eagerness and desire to do some good to the toiling mass of weavers. What is urgently wanted is a very emphatic demonstration of the practicability of the successful and cheaper preparation of the warp and weft, of the successful and speedy production of cloths on different improved looms, and of the successful and beneficial system of co-operation amongst a body of weavers conducting their trade on up-to-date methods.

It is most humbly submitted that an allotment of certain sums of money by the Government for pecuniary help to the weaving population or the gifts of private individuals for that purpose will not really solve the problem of the re-organization of the hand-loom industry. It is not merely a technical or a financial question, but the domestic and social conditions of the people will also

have to be looked to. It will probaly entail a great amount of patient and energetic work, both on the part of Government and of earnest and patriotically inclined public men, before solid results can be brought to light. Government may be pleased to lead the way, but it will certainly rest with truly sympathetic class of earnest missionaries from the people to gradually lift this degenerate mass of weavers to a more intelligent and prosperous state of existence in the true spirit of *Swadeshism*. .

APPENDIX B

Industrial Survey Questions and Answers.

Amraoli, May 1909.

DEAR SIR,

I send herewith a set of questions framed for the purpose of collecting the information which it is essential that the Industrial Conference should have to deal in a methodical, satisfactory and effective manner with the work with which it has charged itself. I trust that you will be so good as to give early attention to this matter and send your reply at as early a date as possible, so that the information so collected might be compiled, classified and assorted before the beginning of October next. If the information sought for is received within the period mentioned, it is proposed to issue the classified compilation to the several Provincial Committees in time to enable the members to make specific proposals and recommendations based on it.

Yours faithfully,
R. N. MUDHOLKAR,
*General Secretary,
Indian Industrial Conference.*

QUESTIONS TO BE ANSWERED.

A.—Agriculture.

1. What is the condition of the agricultural industry in your district ?
2. Has the whole or the greater portion of the culturable area been brought under cultivation ?
3. What is the general quality of the soil ?
4. What is the general condition of the land-owning and cultivating classes ?
5. To what extent are the lands held on a proprietary tenure by the cultivators themselves, to what extent by privileged tenants, and to what extent by mere tenants at will ?

6. What steps are being taken in your district for the improvements of agriculture by—

- (a) Supply of cheap capital ;
- (b) Extension of scientific and practical instruction ;
- (c) Employment of improved appliances ;
- (d) Resort to recuperative processes like manure, etc.

7. To what extent has advantage been taken of the village co-operative credit system, and what amelioration has it effected in the condition of the peasantry ?

B.—Manufacturing Industries.

8. Name the existing manufacturing industries in the different towns and villages of your district under the following heads :—

- (1) Textile fabrics—Cotton, Wool, Silk, and Jute.
- (2) Vegetable and animal products.
- (3) Leather, horn and paper.
- (4) Pottery, porcelain and glass.
- (5) Metals.
- (6) Chemical industries.
- (7) Furniture and decorations.
- (8) Materials used in construction.

9. What is their present condition ?

10. What was their condition in the past ?

11. What is the approximate number of people employed in and dependent on them severally ?

12. What is the approximate amount of capital employed in them severally ?

13. State how far they have been affected by competition with imported articles.

14. What are the markets for the products of these industries, *i.e.*, do they supply only a local demand, or are they sent to other markets in noticeable quantities ?

15. What facilities exist to increase their supply if an increased demand arose ?

16. How far, in your opinion, are the existing industries capable of expansion,—

- (a) by making advances to the artisans at low rates of interest ;
- (b) by the improvement of the appliances in use ;

- (c) by the imparting of special instruction, and
- (d) by the employment of power machinery ?

17. What industries existed in your district formerly but have since decayed ?

18. What are the causes of their decay ?

19. Is it practicable to revive any of them profitably ?

20. If so, suggest measures to bring about their revival.

C.—Minerals and other Natural Products..

21. Name the mineral and other natural products of your district which are or can be manufactured into finished articles of consumption and use.

22. Which of these are manufactured in your district ?

23. Which, if any, of these are sent to other parts of the country for manufacture ?

24. Which of them are exported to foreign countries in their raw state, and re-imported as finished articles ?

D.—Capital.

25. What banking facilities are there for the support of the industries in your district ?

26. Have any urban industrial banks been started in any town of your district under the provisions of the Co-operative Credit Societies Act ?

27. If so, give particulars in regard to their organization the capital employed, the conditions of lending and borrowing, etc.

E.—Technical Education.

28. What facilities are there for training young men in the various industries that exist in your district ?

29. If there are any special schools for the purpose, give particulars in regard to their curricula.

30. Is instruction given both in the practice of and the principles which underlie an industry, or, is it theoretical merely or merely empirical ?

31. What success has attended these schools ?

32. Are industrial and commercial classes attached to any of the schools in your district ?

33. If so, give full particulars in regard to them.

34. Have any students been sent abroad from your district to acquire technical, industrial or commercial education ?

35. What are their qualifications and were they tested?

36. Who, or what agency, has sent them and under what conditions, if any ?

37. In what countries are they being trained ?

38. What arrangements are made to utilise their special technical knowledge by the supply of capital or otherwise, to start or develop the industries in which they receive special training ?

39. Are there at present in your district any person who have received special training in any industry ? If so what are the industries in which they have been trained ?

40. How are they employed at present ?

41. If their knowledge is not being utilised, what steps can be, or are proposed to be taken, to utilize it.

F.—Industrial Associations.

42. Is there any industrial association in your district ? If so, give particulars in regard to its objects, rules, funds, past work and present activity ?

ANSWERS TO THE ABOVE.

(1) M. B. SANT, ESQ., Mhow (Central India.)

A.—Agriculture.

1 & 4. The general condition of agricultural Industry is not very flourishing, though it is believed to have improved within the last 30 years.

2. Nearly $\frac{1}{5}$ of the total culturable area is left uncultivated and is nearly equal in extent to the land already under cultivation.

3. The quality of the soil is that generally known as Black Cotton soil, in which crops are possible even with a slight rainfall.

5. Lands held directly from the Durbar are called Khalsa or kothar lands. There are also Jagir and Muafi gift lands. In these Provinces, the Native States claim the sole proprietorship of the soil. No occupancy rights are allowed

to cultivators in theory, although in practice, long possession confers a right. Leases to cultivators are granted for one year only.

6. Tagai advances are made to cultivators in cases of necessity and in some isolated places attempts are made to introduce new seeds, beyond this no systematic efforts are being made for improvements in agriculture.

7. There are no Co-operative Societies to help agriculturists in these Provinces.

B.—Manufacturing Industries.

8. This Province is not much noted for its industrial activity and being generally backward in education, very little attempt is being made either to foster and expand old industries or to start new ones.

(1) There are 2 old weaving Mills at Indore, one worked by the State, which turn out cloth of ordinary texture. A new Mill is being started by some enterprising merchants of Bombay.

Chanderi, Maheshwar, Mandousar, Gautampura, &c., are still noted for their textile Industry.

Maheshwar for Saris and Dhotis.

Chanderi *Sarangpur & Sehore* for fine and delicate muslins, turbans &c.

Dyeing and printing (alita color) are carried on at Mandousar and Gautampura.

(2) Vegetables are not plentiful and are rather dear, when compared with rates at Poona and other places in the Deccan. Supply of fruits is also very scanty and many of them have to be obtained from distant places like Nagpur, &c. There are also no animal products worth mention, this being an inland tract far away from sea-shore.

(3) Lot of boots and shoe makers are dispersed in several places in Central India, but there is no organized tannery or leather factory.

(4) There are no porcelain or glass works of note with the exception of a small porcelain factory at Mhow, which supplies the demands of the Military supply and other departments.

(5) Inlaid metal work is manufactured at Rampura in the Indore State.

(6) No chemical or furniture works in this district.

(8) Neemuch and Sutna produce lime-stone which is in great demand for building purposes.

(9) and (10) Many of the Industries mentioned above, were in a flourishing condition at Oojein, Maheshwar and a few other places, which were formerly recognized as their chief centres, but they have almost disappeared owing to foreign competition and an influx of cheap machine-made goods.

(11) and (13) The following is the synopsis of the Census Report of 1901, showing severally the population engaged in important industries :—

			Rough
Total population ...	...	...	86,28,000
Textile industry ...	...	...	3,04,000
Vegetable dealers...	...	...	2,69,000
Leather industry ...	...	...	2,17,000
Pottery (Earthen and stoneware)	...	...	82,000
Metal works ...	...	...	1,06,000

(12) There are no means to ascertain the capital invested in these Industries.

(14) and (15) Saries and Dhories prepared at Maheshwar are exported principally to the Deccan. There are at present no facilities to expand the existing industries in the absence of any enterprising merchants or educated people anxious to introduce new methods or machinery for their improvement.

(16, 17, 19 and 20) It appears from the records left by Grecian travellers that in very ancient times, Oojein was a very important centre of the commerce of Central India, from which articles of Indian manufacture used to be exported via, Barygaza (present Broach) to distant foreign countries.

It is possible even now to revive many of the old industries and introduce new ones.

(a) By compulsory primary education, as this province is backward in this respect.

(b) By advancing sums to deserving artisans for reviving their old crafts.

(c) By introducing cheap special machinery as is used now-a-days in foreign countries under the supervision of experts.

(d) By the use also of power machinery for starting factories for manufacture on large scale.

(e) By opening Technical Schools in important towns in this province for the practical training of young boys in different arts.

C.—Minerals and other natural products.

(21 to 24). Central India is not noted much for its mineral wealth.

Coal is found in Umaria, where a colliery is already working.

Copper is found at Barde and at Tangwa village in Rewah State.

It was formerly worked extensively in Shahnagar in the Panna State.

Lead is found at Bargo, a village near Barde. There are traces of rich veins of this metal in hills near Seondha in Datia State and a few other places.

Iron is to be met with throughout the Vindya Mountains to which it gives its red brown color. Richest deposits of this metal occur at Hirapur village in the Bijawar State, once a famous centre of iron smelting industry.

Other centres are Barwaha in Indore State.

Manganese found in Gwalior State and in Jhabna.

Building Stone. Neemach and Satna Lime-stones are exported in considerable quantities. Sand stones are found in several localities in the Vindya Mountains.

Gems found in Panna State.

Asbestos in parts of Bhopawar State.

The ores of these minerals are lying in a neglected state and none of them are exported and reimported as finished articles.

D.—Capital.

25. The bankers of the Indore and other States used to become surety for the revenue of certain tracts of land

making advances of grain and money to the cultivators and recouping themselves from the Revenue.

The succession of bad years has now made it difficult to get bankers to undertake this responsibility.

(26 and 27). So far as known, there are no Credit Co-operative Societies in the District.

E.—Technical Education.

Gwalior has some Military & Technical schools. There are Engineering and Medical classes in Indore.

At Mhow, Neemach and Indore there are industrial schools under the management of Missioneries for teaching weaving, carpentry, &c.

No students appear to have been sent abroad for technical training from Central India.

Industrial Associations.

So far as known there are no associations of the kind in this province.

(2) M. GOLOKNATH, ESQ., JULLUNDUR CITY.

A.—Agriculture.

1. From the material available in the official records, it would appear that a very large number of the population depends in great measure for their livelihood upon the yield of agricultural operations. The people are intelligent and industrious. Cultivators are never idle always doing something or another.

2. There is very little really culturable land left now untilled. But dry cultivation is being steadily replaced by irrigation, which is entirely from wells, there being no canals.

3. The Jullundur district is divided into four subdivisions called Tehsils; viz., Jullundur, Nakodar, Phillom and Nawashahi. The soil is as a rule, good; most of it very good. But there is a great deal of poor land in Jullundur and Nakodar Tehsils. A strip of hard red land called *rarra* runs through the Nawashahi and Phillom Tehsils. The land in these Tehsils below the old bank of the river Satlej is full of *kallar* and is flooded in the rains. The soil is marked

by varieties, but it does not present any unusual features. There is a stiff cohesive, dark coloured and productive soil generally called *rausli*; the light loam called *maira*; soft sandy soils, *ralli* and *tibba*; and a hard sandy soil *rarri*. The sandy soil should not be despised. Ground which appears common sand is often to be seen waving with wheat. There is also a description of soil styled *chambh*. It is of much importance in some parts of the Punjab, but does not exist in large areas here. Its main characteristic is moisture. It is perforated with holes and cracks; water percolates through it and is always to be met with close to the surface. Its appearance is swampy. Considerable value is attached to it, and it is very favourable for production of rice. Another kind of soil *surwal* is unirrigated and yields, notwithstanding plentiful crops; this land is only to be found in the Jallundhur Tehsil. Another kind is *bet* or the land along the river Satlej which wants no irrigation; but requires of course an average rain-fall when it yields good crops.

4. Fairly prosperous.

5. The following figures from the papers of the last settlement show approximately the distribution of tenures.

Number of holdings.

Proprietors cultivating own land.	Proprietors cultivating land in which they have only a share.	Occupancy tenants.	Non-occupancy tenants.	Mortgages.	Muafidars and Sanjidars.	Total.
64,331	81,464	23,965	86,560	22,025	4,265	2,82,610

6. (a) Nothing in particular.

(b) Hardly any.

(c) The attention of agriculturists has not been much directed towards employment of improved appliances for the improvement of agriculture. They are most conservative in their ideas and would rather stick to the primitive methods. At the instance of the Government Agricultural

Department, the District Board Jullundur had recently imported the mowing and reaping machine, as also a winnowing machine; and even the demonstration given therefrom failed to induce the agriculturists to take to them.

(d) In the neighbourhood of populous towns rich manured land is to be found, but as a rule the people do not make the most of the substances for manure which nature provides. The villagers generally use only the manure obtained from the dung of their cattle.

7. The last report on the working of Co-operative Credit Societies in the Punjab for the year ending 30th June 1908 shows that in the Jullundur district there were 35 Societies with a working capital of Rs. 1,13,368 at the end of the year.

The addition of 18 new Societies brings the number of Societies to 53.

The Societies are reported to be doing good work, which should mean that peasantry is benefitted thereby.

In this movement Jullundur stands second in this Province.

B.—Manufacturing Industries.

8 & 8 (1). There is considerable manufacture of silk in the town of Jullundur. The Basti Daryai-bafs (weavers of silk) have now commenced to turn out beautiful grey coloured gentlemen's suit pieces which have found much favour in the market. Wool manufacture was once extensively carried on in Phillom Tehsil and very fine blankets were made in Bilga, a village in the same Tehsil. Now only inferior loes (blankets) are manufactured.

The principal seats for the manufacture of country cloth are Jullundur, Rahon, Kartarpur and Nurmahal. Rahon was once famous for the manufacture of the highly glazed cotton longcloth called *ghatti*, from which the summer full dress of wealthy persons was formerly made. It was very similar in texture to the Irish linen. Mr. Lockwood Kipling, late Principal of the Lahore School of Art writes: "It will be a long time before natives give up talking of Rahonghatti."

The importation of English longcloth has unfortunately ruined this trade.

(2) The great manufacture is that of gur, sugar and molasses. Ropes are also made from the refuse of sugarcane.

(3) The work of dyeing leather, and curing of skins, is carried on in many villages by the menial class called Chamars. They pass on the hides to the Khojas, a class of Mohamadans living in the town of Jullundur who alone trade in leather and export the same to other places.

(4) Jullundur is frequently spoken of as excelling in Pottery ware, but there can scarcely be said to be a trade thereof. Here and there an artist is met with in the District who turns out excellent specimens of coloured and enamelled tile-work of the old Mughal style at many places in the province.

There is no industry of Porcelain or glass.

(5) Country locks of brass are manufactured on a large scale at Jullundur and in the Nawashahi Tehsils.

(6) None.

(7) Like the neighbouring district of Hoshiarpur, Jullundur has now gained some reputation for wood work. Screens, tables, picture frames and sundry other ornamental furniture with ivory or brass inlaid work are largely manufactured in the town of Jullundur and Kartarpur; the latter has also made a name for the wholesale trade of cane-seated chairs of all descriptions.

(8) The industry of brick-making has of late been found a very paying concern, and labourers in large numbers are seen to be working on the brick kilns in most of the large towns of this district. These, however, supply the local demand only, as there is a great tendency of building houses after the modern style in the open air away from the town, a lesson taught them by the repeated attacks of plague. For the same reason the number of depots of wood used for building purposes has considerably increased.

11 & 12. Information not available.

13. The weavers have suffered considerably. It is impossible for them to compete with those capitalists, who import piece-goods made by machines.

14. The articles mentioned in the preceding notes,

the trade of which is flourishing are generally exported to larger towns such as Amritsar, Lahore and the port towns.

15. Here, as is the case everywhere in India, industries have remained fixed to particular castes ; e. g., the son of a weaver must become a weaver by calling and such being the case, if an increased demand arose the sons of that very artisan who for want of demand had reluctantly taken an another industry would readily come back to supply up increased demand of any particular industry ; but it is hard to say to what extent with their limited capital and without any improved appliances.

16 (a). This is exactly what is wanted. They cannot afford to pay high rates of interest.

(b) & (c). It goes without saying that those industries are capable of expansion by the improvement of the appliances in use, but nothing can be definitely said to what extent.

(d) Ditto. But Zullundur is too poor a District to think about this at least for the present.

D.—Capital.

25. Banks have no doubt sprung up like mushrooms everywhere, but none seem to have been started with the object of supporting industries, which means lending out money at low rates of interest.

(3). INDROE STATE.

B.—Manufacturing Industries.

8. (1) There are two spinning and weaving cotton mills, one belonging to the State and known as "the Indore State Cotton Mills" and the other belonging to a Joint Stock Company carrying on business under the name and style of "The Indore Malwa United Mills Company, Ltd."

There are 36 Cotton Ginning-Factories and 10 Cotton Presses in the different towns and villages. These work in the Cotton season, i. e., about 4 months in the year. None of them falls under the term ' factories ' as defined in the State Factory Act.

There are no silk, wool, or jute industries in this State.

(2) The main products are wheat, jawar, cotton, maize, oil seeds and opium.

There is one flour Mill opened in the City of Indore last year where wheat is ground into flour.

There are no organized industries dealing in oil seeds or animal products.

Opium is largely grown in the Malwa Districts of Indore, Mahidpur and Rampura-Bhanpura. The cultivation of opium is, however, on the decline owing to restriction placed on the export of Malwa opium to China and its prohibition into several Indian provinces. It is now exported to Madras, Hyderabad, Berars, Bombay and in a limited quantity to China.

Raw opium is manufactured into balls in the City of Indore and the towns of Rampura and Bhanpura by means of manual labour. The manufacture is prohibited except under a license.

(3) There are no leather-factories or horn industries in an organized form. The local Chamars tan hides in the old fashion and make country shoes, boots and charsas to meet local demand. The number of chamars earning their livelihood by these means is about 3,000.

At Mouza Sutarkheri, near Mhow Cantonment tanning is done by European processes on a small scale.

There are no paper mills or factories in existence. A rough country paper called Malvi paper used to be manufactured at Indore, but the Malvi paper is now supplanted by imported paper manufactured in the European method, similar in look and size but superior in finish and glaze and cheaper in price.

(4) There are no organized potteries or porcelain and glass factories. The local kumars or potters make earthen pots and clumsy toys for local use.

Mortars are made from a hard greenish stone at Nimawar while Mauza Sagonia in the same district is noted for its grinding stones. These industries are, however, not on a big scale.

(5) There are no metal factories worked by means of mechanical power. There are, however, a number of copper

and brass smiths in the city of Indore who turn out copper and brass pots and utensils for local use and to a certain extent for export in the neighbouring towns and States.

Parda, a village in the Rampura District is celebrated for its iron, copper and brass industry, the manufacture being confined to cooking pots and other utensils. The industries are worked by manual labour as in the days past.

Some fine silverware is manufactured in the Rampura town.

(6) There are no Chemical industries.

(7) There are no organised factories dealing in furniture and decorations, which are mostly imported from Bombay and elsewhere. In the City of Indore ordinary furniture is made by carpenters for use in the State Offices and private families.

(8) There are no organized industries for producing materials used in construction. The local Kumars make ordinary bricks and tiles for local use in all the principle towns and villages.

There are a number of quarries of ordinary stone used in building. These meet the local wants. Superior stone is imported from Ajmere, Bhopal, Neemuch &c.

9. The only industry for which the State is noted from olden times, is the manufacture of Saries and Khans (the principle dress of females) at Maheswar. The Maheswar Saries are well-known for the fineness of texture and their silk borders. Being of superior material they are naturally more costly than those made in Nagpur, Jhansi, &c., and the industry at Maheswar has consequently contracted.

Cotton industry consisting of Gins, Presses and Weaving and Spinning Mills is of recent date. Before 1900 A. D. there were only 5 cotton Gins and Presses and the one Weaving and Spinning Mill belonging to the State. The number of Gins and Presses has since risen to 40 and is likely to increase. The State Mill is in a flourishing condition. The other Mill started only about 3 months ago at present produces yarn only. The Weaving Department will be

opened very soon. On the whole the cotton industry is thriving.

The calico printing industry at Gautampura a small town in the Indore District is of some note. The work is done by manual labour as in the days past. Calico printed at Gautampura is exported to Khandesh, Marwar and other Districts where it is in fashion.

10. Practically the old industries are iron works of Parda and Series of Mahesar.

Before the advent of Railways in Central India, the Parda iron supplied the local wants and was also exported to the neighbouring States and Provinces. The Industry was then extensive and in good condition.

The Sari Industry of Mahesar was also in a flourishing condition.

11. The number of hands employed in the two Spinning and Weaving Mills is over 2,500. During the Cotton season about 2,000 men are employed in the various cotton Gins and Presses. The Cotton Industry in its various branches accounts for the maintenance of about 15,000 souls.

About 5,000 persons are engaged in Metal industries mentioned above. The number of persons (including dependants) earning their necessities of life from metal trade is estimated at 11,000.

The working strength on the pottery establishments throughout the State is estimated at 4,000 hands and the number of dependants on that industry is about 12,000.

12. The cost of machinery and building of the two weaving and spinning Mills is over thirty lakhs of rupees and that of Cotton Gins and Presses approximately amounts to about 22 lakhs. The machinery, etc., of the flour mill cost one lac of rupees. The working capital of the two weaving and spinning mills may be put down at about 11 lacs.

The capital employed in the Saree Industry of Mahesar may be estimated at one lac and that in the calico industry at Gautampura nearly 1,50,000 rupees.

The metal sheets imported into the State and utilized in the manufacture of utensils locally would be worth nearly two lacs of rupees.

13. Generally speaking the Indore State does not produce any articles which are capable of being affected by foreign competition.

The products of the two Spinning and Weaving Mills are protected against competition by mills started in other parts of India, so far as local consumption is concerned, as a duty of 7·13 per cent. *ad valorem* is charged on all cloth and yarn similar to that produced in the mills (*i. e.*, 16 to 20 and 8 to 20 counts respectively) imported into the State.

The Saree Industry of Maheswar has no doubt suffered considerably from the import of cheaper texture manufactured in other parts of India.

The trade in metal utensils is also slightly affected by the import of crockery and enamelled ware.

14. The cloth turned out in the State Cotton Mills is largely consumed within the State. It is also exported to Khandwa, Ajmere and other places.

The only other article that is considerably exported is Mahesar Sarees. It finds its way to all the principal markets in the Deccan where it is very much appreciated for its fine texture and finish.

The calico of Gautampura is also in demand in Khandesh, Marwar and other neighbouring provinces.

15. The cotton mills in their present construction and fittings are capable of larger outturn in the event of the demand for articles produced therein being increased.

For Mahesar Sarees and Gautampura calico printing the existing demand is hardly capable of rising. Even supposing that the demand can increase, there is not enough of capital and men versed in weaving and calico printing to join hand with their brethren already engaged.

16. The products of the Indore industries are mostly consumed within the State. Outside the State they are in demand, only in a few Indian Provinces only. The ancient industries of the Indore State existing to this day, are therefore hardly capable of much improvement by means suggested in *a*, *b*, *c*, and *d*.

It is, however, proposed to hold industrial and agricultural Exhibitions in the State. Articles produced by local industry are also sent as exhibits to the exhibitions held elsewhere.

17. Formerly the manufacture of perfumed oils in the Rampura District, of Aal dye in Nimar and of Iron utensils in Nimawar and Rampura was of some importance.

18. The scents manufactured after the European method are now generally preferred to perfumed oils manufactured on the old system which are also more costly. The perfume industry at Rampura which was never on a very large scale, has now declined perceptibly.

The Aal dye of Nimar could not hold its ground against the imported Chemical dyes and Aal cultivation like that of indigo in other parts of India was, therefore, abandoned.

19. Not very.

C.—Minerals and other Natural Products.

21. There are mines of mineral (iron and copper) ores to be found in some places in the Rampura, Nimawar and Nimar Districts but it has not been yet found profitable to work them. There is however, a large number of stone and lime stone quarries throughout the State. Marble or other superior stone has not yet been discovered.

22. The Silawats of the City and Nimawar District make grinding stones, toys, pestles and mortars. These are not exported in any appreciable quantity.

(1) 23 & 24. None.

D.—Capital.

25. There are no special banking facilities in the State for the support of local industries. There are branches of the Bombay Bank and the Indian Specie Bank, but these deal specially with merchants carrying on business in opium, gold, silver and other goods.

There are numerous local firms and Saokars who lend money to artisans and others engaged in the several industries on interest.

(1) 26 & 27. None.

E.—Technical Education.

28. None from the Department.

29 to 33. None.

34. None outside India. In Bombay, one student is studying Engineering in the Technical Institute, Bombay,

(Mechanical Engineering Department), and one student passed his L. E. E. from the Institute this year.

35. Both of them are the graduates of the University of Calcutta.

36 & 37. By the State, and under conditions specified in the form of agreement enclosed herewith.

Form of Agreement to be signed by Holders of Post-Graduate Scholarships.

I.....having been awarded by the Indore State a scholarship of Rs. 20 per mensem for *four* years (conditionally upon my being of good behaviour and pursuing my studies with diligence) to enable me to qualify myself for the profession of *Engineering* do hereby agree that, after becoming duly qualified for such profession, I will engage to serve the State, if called upon to do so, for a period of not less than five years at a reasonable salary. Such reasonable salary to be not less than the minimum salary paid by this State to any duly qualified member of my profession. Provided always that should the State not call for my services within a period of one year from the date of my becoming qualified, I shall be at liberty to engage myself elsewhere, without breach of this agreement. And I further agree, that if after becoming qualified, I fail to fulfil the terms of this agreement, or, before becoming qualified, discontinue my course of studies without permission, I will refund to the State one half of the amount that shall have been paid to me by way of scholarship.

Dated.....19

Signed.....

38. None to the knowledge of this Department.

39 to 41. None we know of.

42. No.

(4) JUNAGADH STATE.

A.—Agriculture.

1. After the famine of Sanvet, 1956, the agricultural industry was slackened owing to the deprivation of means of cultivation but now the general condition of the cultivating class is improving gradually.

2. Out of the total culturable area of 701,345 acres, 90 per cent. is under cultivation and, 10 per cent. is lying waste. Measures are being adopted to bring the waste land under plough.

3. Black soil, sandy loam and alluvial.

4. 95 per cent. of the land owning and cultivating classes are self-supporting and 5 per cent. poor and needy.

5. The lands in this State are held only by mere tenants-at-will but they are not dispossessed of their lands unless they give resignation and show their inability to cultivate them. Again when a cultivator dies, the land owned by him passes to his surviving son, and if he dies without a son his widow is entitled to it and in the absence of these two, his cousin if undivided, is given the land. Thus the lands though held by cultivators as mere tenants-at-will remain in the possession of the direct heirs of the original possessor, so long as they are surviving.

6. An Agricultural Department has been organised in this State for the last two years for the improvement of agriculture.

(a) which advances loans to agriculturists without interest from a fund of Rs. 60,000, which is expected to increase automatically, for stimulating the sinking of new irrigation wells and the purchase of plough cattle ;

(b) which has started a demonstration farm at a suitable place where experiments in different crops are made on scientific lines to show to the cultivators the modes and results of scientific agriculture, and which has made arrangements to give practical instructions to the younger generation by lecturing upon the essential principles of scientific agriculture ;

(c) which would introduce such improved appliances as would be found on trial to be suitable to our soil ;

(d) and which would add to the stock of general manures now in use, some special manures adapted to the soil and crop, if their effects are found beneficial.

7. Village co-operative credit system is not yet in existence but the introduction of the same on the lines of the Government system with certain modifications to suit the

local conditions engages the serious attention of the administration and draft rules are under preparation.

B.—Manufacturing Industries.

8. (1) There are four cotton presses and twenty ginning factories in the State.

(2) A brisk industry in catching, curing and exporting Bombil fish is carried on at Dhara Bandar, Nawa Bandar and Simar; also Ghee making.

(3) to (7). Nil.

8. Stone at Junagadh, Shahpur, Malia, Chorwad, Verawal, Kutiya and Una, and lime at Junagadh, Malia and Verawal.

9. Good, progressing and encouraging.

10. The condition in the past was fairly good but not progressing.

11 (a). On cotton industry 6,000 souls for a period of five months.

(b) Ghee-making and fish industry, 5,500.

(c) Stone and lime making, 1,000 men.

12. Rupees 10 to 15 lacs in all.

13. These are indigenous industries and so there is no competition with imported articles.

14. The products of these industries not only supply local wants but are exported in fairly large quantities. Stone is supplied to different places in Kathiawad.

Cotton, fish, and ghee are exported to Bombay.

15. Facilities in the shape of reduction of custom duty and transit are given.

16. Cotton and stone industries are capable of being largely expanded. The construction of the Sir Rasul Khanji Mill at Verawal now in progress will go a great way to give an impetus to the cotton industry. The demand for building stone is likely to increase and attempts are being made to open a market for it in Bombay.

(a) (That the industries would expand by the adoption
(b) } of these methods is certain, but it cannot be said
(c) } definitely how far.

(d) It is possible to develop an industry in the cutting and polishing of granite stone which is available in large

quantities of different varieties in the Girnar and other adjoining hills, by the employment of power machinery. Dr. Evans who was employed by the State to explore and report on the Geological products of the State is of opinion that polished granite slabs would have a ready market not only in Bombay and other important cities in India, but even in Europe.

17 to 20. None.

C.—Minerals and other Natural products.

21. Manganese, mica syenite and iron are the chief minerals found in this district. The last three are as yet obtainable in small quantities. The results of recent exploration, show that manganese is likely to be found in abundance.

22 to 24. Nil.

D.—Capital.

25 There are no banking facilities for the support of the industries. Capitalists invest their own money in these industries and when a greater outlay is required they form into a Joint Stock Company and borrow money at a low rate of interest.

26 to 27. None.

E.—Technical Education.

28. The industries that exist in our State and to which reference is made in questions 7 and 8 above do not require special training and hence no facilities are needed to be given.

29. A Techno-Industrial School has just been started in Junagadh for imparting theoretical and practical instruction in drawing, modelling, stone work, carpentry, weaving, metal work and dyeing; these subjects will be brought on the curriculum of the institution in due course.

30. Practical and theoretical both.

31. It is too early to pronounce any definite opinion as to the success of the institution, but it promises to attract students from the manufacturing classes.

32 & 33. No.

34. Yes; to acquire technical education.

35. Mechanical engineers, some are employed in the P. W. D. and some in the ginning factories of the State.

36. They are sent by the State and scholarships are given to them on condition to serve the State with a monthly salary according to the scales fixed for qualified services.

37. In Bombay and Baroda.

38. No such case has yet come up but arrangements will be made to help such a man if the prospects of the profession are likely to be bright.

39 & 40. None.

41. If such persons will turn out, they will either be employed in the State service with a view to utilise their special training or left to themselves to start independent professions in our State by giving certain concessions to encourage such particular industries as have fair prospects to thrive.

F.—Industrial Association.

42. None.

(5). VANKANEER STATE—(KATHIAWAR).

A.—Agriculture.

1. Ordinary.

2. The greater portion of the culturable area has been brought under cultivation.

3 & 4. Ordinary.

5. All cultivators are tenants-at-will.

6 (a) Advances are made to cultivators by the State for sinking wells, purchase of agricultural stock and other purposes.

(b) Nil.

(c) „

(d) Ordinary.

7. Nil.

8. (1) Cotton fabrics : coarse cloth ; wool : blankets ; silk : cloth and turbans ; jute : nil.

(2) Nil.

(3) „

Ordinary pottery.

9. Ordinary.

10. The condition of the cotton industry was better in the past.

11. About 500 persons in all.

12. About Rs. 500 „

13. They have been considerably affected by competition with imported articles.

14. They are sent to other markets in Kathiawar, but not in noticeable quantities.

15. There are certain weavers who have given up their avocation ; if an increased demand arises they would again join it.

16. (a) Not appreciably.

17. None.

D.—Capital.

25. There are local bankers who advance money to the cultivators, artisans etc.

26. No.

E.—Technical Education.

28. Scholarships for technical education are granted by the State to deserving students

34. Yes.

35. Studying in the Victoria Jubilee Technical Institute, Bombay.

36. The State has granted scholarships to them for study.

37. At Bombay.

F.—Industrial Associations.

42. None.

(6) THE STATE OF COCHIN.

A.—Agriculture.

1. 4,12,256 persons constituting about 50.77 per cent. of the population in the State are maintained by agriculture. These figures are according to the Census of 1901. The condition of agriculture is good.

Agricultural operations depend mainly on rainfall—except in one Taluk of the State where the Government owns some irrigation systems.

Cultivation mainly follows rainfall. The agriculture is dependent on the South-West monsoon (June to September). The North-East monsoon sets in about the middle of October but is not so copious, as the South-West. The total annual rainfall is about 120 inches. The country is undulated. The paddy flats are in the valleys and slopes of hills. During the heavy South-West monsoon the high level paddy fields are cultivated. Those slightly lower in level are brought under cultivation during the North-East monsoon season. On low-lying plots, in flood during the monsoons, crops are raised between January and April. The water is distributed into broad channels in the middle of the lands and stored therein for irrigation during the summer months. This species of cultivation is peculiar to this coast. A large and deep lake receiving the drainage from two Taluks is cultivated under this system. In January, the surplus water is pumped off with the help of Oil Engines into deep-cut, broad channels and reservoirs: the several paddy flats are protected by strong bunds and crops are raised on them. The harvesting is completed before the setting in of the S. W. monsoon.

The agricultural conditions are thus regulated by the state of rainfall. The first season locally called 'the viruppu' is the South-West monsoon period: the second, locally known as the 'Mundakan', is the North-East monsoon season: while the third, which is peculiar to this coast, is styled the 'punja' and the 'Kole' season.

Para 3 deals entirely with paddy cultivation. Paddy lands constitute less than 50% of the occupied area in the State. About 2,74,181 acres or 428 square miles are what are known as 'Parambas' or garden lands. Of this extent, more than 162 square miles are fully planted up. About 120 square miles constitute what is called the 'Cocoanut tract.' This area is arenaceous, surrounded by the backwater and

the sea. Cocoanut gardens are the chief feature of this area and the tree attains a degree of fertility unsurpassed by other portions of the presidency. A large population depends on the subsidiary industries brought into existence by these conditions. During the recent Settlement it was ascertained that we have in the State about 30,00,000 (Thirty lakhs) cocoanut trees. Next to the cocoanut tree in importance comes the areca. It constitutes the staple 'paramba' product in one Taluk of the State and is also found in the other Taluks. The area under arecanut cultivation is roughly about 60 square miles as even in the cocoanut tract we get areca trees. About fifty-five hundred thousand arecanut trees were counted during the Settlement. The jack comes next in importance. It is met with all over the State and, during the Settlement, about three hundred thousand were counted. There is pepper cultivation all over the State on a small scale while nutmegs, cloves, &c, are seen in the portions of the State adjoining the Forest. On unplanted 'parambas' different kinds of dry crops are raised,—channa, ragi, groundnut, tapioca, gingelly, &c. Banana is grown on a large scale in almost all parts of the State.

Of the total agricultural population, more than a third depend on garden cultivation.

Coffee is grown on the Nelliampathies. There are 19 lease hold Estates covering about 14 square miles. There are now 6 Rubber Estates in various portions of the State about 5 square miles in extent. About 10 sq. miles have been recently sold for rubber and it is proposed to throw open a large area for this cultivation.

2. Yes. All assigned lands are under cultivation. There are no relinquishments. The total extent of assigned lands in the State is 4,79,975 acres. About 16,903 acres of lands fit for cultivation remain uncultivated. These areas are now being applied for by the ryots.

3. The soil is generally fertile. The State can be roughly divided into two 'tracts'—the red ferruginous and the arenaceous. As already stated, the soil in the cocoanut

zone is arenaceous. The other portions are mainly red ferruginous. Alluvial soil is met with on the banks of rivers and lakes. Adjoining the forest tracts, vegetation is luxuriant and valuable timber is met with.

4&5. The system of landholding in the State is rather peculiar.

The proprietary right in lands is called the 'jenmom' and the proprietor the 'jenmi.' All the lands in the State are divided among jenmies, the State being the largest jenmi. Under the jenmi come the several classes of field labourers and tenants with various degrees of interest in the land. Lowest down in the scale is the actual tiller of the soil who has no rights and is removable at will. It is in fact hired labour. Ascending in the scale, we get the 'tenant' class, which is divisible into three groups.

(a) The "Verumpattom" tenants. Legally he can be evicted by the jenmi at any time. When he is evicted he is entitled to the value of the improvements effected by him on the land, if he has not contracted himself out of it,

(b) the "Kanom" tenant. He has advanced a sum of money to the jenmi. The rent to be paid is less than in the case of the ordinary tenant. He cannot be evicted for 12 years from the date of the commencement of his lease. There is a 'renewal' of the lease after this period. The jenmi has the power to evict him after 12 years but must pay him the amount advanced and the value of the improvements effected by him. Eviction is however rarely resorted to in the case of this class of tenants.

(c) the "Karima", the "Adima", "Anubhogam", &c, tenants. These have occupancy right. They cannot be evicted. They pay only a nominal rent. This class is very small in number.

Of the total cultivated area in the State, 420 sq. miles (2,69,964 acres) belong to private jenmies and about 330 sq. miles (2,10,011 acres) vest in the State as jenmi.

By a proclamation of the 10th March 1905, His Highness's Government conceded occupancy rights to all the tenants holding lands under the sirkar. A scheme

Settlement, based on the ryotwari system obtaining in the Madras Presidency, was introduced. This measure has created a happy and contented ryotwari class with permanent interest in the soil and liable to pay only a moderate assessment.

The question of regulating the relations between the jenmis holding practically the other half of the State—and the tenants under them, is now under the consideration of His Highness' Government.

The following tabular statement, based on the Census of 1901 shows the details of land owning and cultivation :—

Cultivating land owners	...	6,566
Non-cultivating do	...	7,518
Cultivating tenants	...	1,81,877
Non-cultivating tenants	...	10,195
Field labourers	...	2,08,280
Other cultivators, such as planters, pepper growers, cocoanut growers.	...	25,474
Total		4,39,910

*This figure includes dependents on those actually employed in the profession and partial agriculturist.

The following statement classifies the Pattadars according to the assessment paid by them.

<i>Pattadars paying.</i>	<i>Number.</i>	<i>Assessment.</i>	
Re. 1 and less	13,926	6,367	11 7
Rs. 10 and over	Re.1,25,529	1,00,756	15 0
„ 30 and „ 10	7,994	1,36,876	8 10
„ 50 and „ 30	2,170	83,766	4 8
„ 100 and „ 50	1,976	1,37,877	12 9
„ 250 and „ 100	1,382	2,11,314	10 4
„ 500 and „ 250	422	1,45,286	6 7
„ 1,000 and „ 500	132	90,426	13 5
Over Rs. 1,000	65	97,799	15 8

Total number of Pattadars = 53,596.

Classes I and II are practically formed of the tenants to whom the State recently conceded occupancy right.

6. Agriculture is improved by the State in the following ways :—

(a) Agricultural and land improvement loans are issued by the Government every year. The rate of interest is 5% and the repayment is spread over 10 years ordinarily.

(b) The State has got a small Agricultural Department. The Superintendent of Agriculture tours over the whole State and instructs ryots in scientific agriculture. There are two Agricultural Associations which are not, however, doing much useful work in this direction. The Government has also established a Demonstration Farm at Trichur. An Agricultural and Industrial Exhibition is held annually in February. Demonstrations are given in improved methods of agriculture, &c.

(c) See answer to (b) above.

(d) See answer to (b) & (c) above. Head loads of greey manure may be collected by ryots from forests without ann fees. Fish manure is manufactured in the State by several firms and is becoming popular. The commonest manures are leaves of trees, cowdung, &c.

7. No village Co-operative system in the State.

B.—Manufacturing Industries.

8 (a) Weaving is carried on in almost all parts of the State. Fly shuttle and Japanese looms in Trichur, Ernakulam and Tathamangalam. Pitlooms are very common. Chittur Taluk is famous for its cloths—ordinary and laceds

There are no manufactures in wool, silk or jute.

Grass mats are made on a large scale in Talapilly and Chittur Taluks.

Tanning has recently been introduced. Leather goods are also manufactured. Chrome tanning is tried on a small scale.

Vegetable products.

The first and foremost industry in the State is the extraction of oil from cocoanuts, the extraction of coconut fibre and other allied industries. There are many oil mills

worked with steam power in Cochin and Ernakulam. The following are important :—

1. Abdul Alis Oil Mill	Palluruthy.
2. Vallibhoy Kadirbhoy & Co.	Do.
3. Ranjid Dass Ketsi & Sons	Do.
4. Kannu Pillai . .	Palluruthy.
5. Abdul Sathar Haji Moosa	Do.
6. Vallabha Dass Narayanan	Do.
7. Vasu Deva Shenoi	Vypeen
8. Perumthodathu Eloyathu	Ernakulam
9. S. Koder & Sons	Do.

Extraction of oil through country oil press is very common. Oils are also extracted from gingelly, groundnut castor, &c.,

Rugs, mats, &c, are made from cocoanut fibres. Superior rugs and mats are manufactured in the Central Jail at Ernakulam. There are also many private concerns in Cochin. These industries are all in a very thriving condition and large exports of these products are made to the Continent.

Animal products. Sardines and other fish and Prawn are exported from Cochin in large quantities. From Sardines is extracted an oil which is largely used. This oil is exported. Fish manure is now manufactured by the Indian Fisheries Company in Vypeen.

Pottery, porcelain and glass. Pottery. This is done on the primitive system. Potteries of superior quality are not made.

Tiles and bricks are manufactured in many of the Taluks. The following are some of the important tile factories :—

Trichur Taluk :

1. Arimbur Pallen Kunju Vareed's Factory.
2. The Viyyur Tile and Brick Factory.
3. The Mukkattukara Tile &c., Factory.
4. The Ollun. Tile and Brick Factory.
5. Attokaren Devassi's Tile and Brick Factory

Mukundapuram Taluk.

1. The Manali Eastern Tile Factory.
2. do. Western Tile Factory.
3. Manayanthura Sankunni Menon's Tile Factory
4. Chembukavu Rappay's do.
5. Akkarapatti's Tile Factory.
6. Ittimathu's Tile Works.
7. Joseph N. & Co.'s Tile Works.

Chittur Taluk.

1. Ambat Eachara Menon's Factory.
2. Kozhinjampara Factory.

Porcelain and Clay.

No manufactures.

Metals : Domestic utensils in copper and bronze &c., are made. There is a special class of persons engaged in this industry. Copper vessels are exclusively made by the descendants of the Portuguese.

The workmen employed in making vessels of bronze are called Musaries.

Bell-metal vessels produced in the State are of superior quality. The alloy used is such that the vessels are not acted upon by acids. Almost every village has its bell metal workers but the industry is carried on a large scale in Chittur Trichur and Cranganur.

Furniture and Decorations. There are carpenters in all the important towns of the State. Many of them are skilled workmen. There is however no organisation among them and no firm of furniture makers. Carving in wood and ivory is done in Trichur, Trippunithura and other places. But the number of such workmen has diminished owing to there being no demand for such work. There are also skilled goldsmiths, &c.,

Materials used in Construction. See tiles above.

Shells obtained from backwaters are converted into lime. There are also limestone quarries in Chittur Taluk. Boat building goes on on a large scale.

9 to 11. The Industries under the heads 1 to 8 are steadily developing. This will be evident from the sub-joined table :—

Name of the Industry.	No. engaged in 1891.	No. engaged in 1901.	
Textile fabrics Cotton weavers ..	2,061	2,832	In 1901 there were only pitlooms. Fly shuttle looms have now been introduced.
Vegetable and animal products (Cocoanut fibres) ...	5,080	27,455	The industry has been developing and now more than 40,000 persons depend on it.
Pottery (tiles) Factories ...		1	The No. of factories is steadily increasing. There are now as many as 14 factories.
Metals.—			
Brass, bell-metal,	351	665	
Iron, &c., ...	1,307	2,750	
Furniture & Decorations ...	6	104	
Building materials, Masons &c.— ...	1,098	2,916	
Boat builders ...	...	69	
Lime & Chunnam burners ...	196	668	

The statement represents the number of persons employed in the several industries in 1891 and 1901. It is observed that the persons now employed in the various industries has been steadily rising. With the introduction of Railway, the State has been opened for traffic with the outside World. The opening of a Tramway through the Forests has materially improved the condition of the country by (1) providing employment and (2) making good timber accessible.

The statement given above shows approximately the number of persons employed in the various industries.

The statement does not however represent the number

of persons employed in the several oil mills and factories. Each mill ordinarily employs between 300 to 400 operatives.

12. The capital invested in the oil mill ranges between one lakh and five lakhs while that invested in the Tile Factories ranges from 5 to 25 thousands. As regards weaving, there are only two factories in which the capital employed will be about Rs. 20,000. Weavers generally work in their houses and are not capitalists. The same remarks apply to bellmetal workers. Accurate statistics as regards capital invested by various firms are not available.

13. There are only a few industries in this State which have been affected by articles imported from outside.

The chief articles of industry are products from cocoanuts. The articles such as copra, oil, fibres, coir, and finished products, such as mats and rugs are exported.

Next in importance is the product from fish. Fish cured, and fish manure are exported to foreign markets.

Before the establishment of Tile Factories, Mission Tiles were being imported either from Mangalore or Calicut. The importation is steadily decreasing due to an abundant supply of tiles made within the State.

Weaving, more or less the staple industry of the State is not developing, in the same proportion as the population. In fact, in some centres, it is dying out. This is owing, in some measure, to the competition of power loom made goods.

14. Copra, cocoanut oil, fibres, rugs, &c., made from, cocoanut fibres find their markets in European countries as well as in the several commercial centres in India

15. Fish and manure are exported in large quantities to other parts of India and also to England and Japan.

There is enough supply of products of cocoanut for export after meeting the local demand. So is the case with fish.

Pepper is also exported on a small scale.

Cloths are not exported. There is not enough to meet the local demand.

16. The industries connected with the cocoanut are all too well established to need assistance at the hands of the Government.

Weaving and bell-metal and other industries will develop, if encouraged in the ways mentioned. Carpentry, &c, also stand in need of such encouragement.

The general question of industries in the State and the methods of improving them is under the consideration of the Government.

C.—Minerals and other products.

21 to 24. The following extract from the Census Report of 1901 describes the minerals of the State.

"The only mineral productions, so to speak, obtained in any remarkable quantities are laterite and granite used for building purposes, the former more largely than the latter. Calcareous shells are collected from the sea-coast, the sea and the lagoons. In several places, traces of iron ore are common, being found in mines, veins, chiefly in the substance of the laterite. Mica is met with in some places, but it is not worked.

A geological survey of the whole State is under contemplation.

D.—Capital.

25. At present there are no facilities for the support of industries. There are private bankers or sowcars whose rates of interest are very high.

26 & 27. No.

F.—Technical Education.

29. There are now facilities of training men in weaving and tanning industries. One of the weaving Factories (fly shuttle looms) takes apprentices.

There are technical schools in the State in which instructions are given in carpentry, weaving, printing, making of leather goods, embroidery, &c. These are :

The Industrial School, Ernaculam,

The Elthuruthy Convent, Trichur,

The Kunnankulam Industrial School.

30. The instruction is not scientific. It is mainly practical.

31. They have so far trained only a few students and have made no impression on the bulk of the workmen.

32 to 34. No.

The Government have sanctioned a scholarship to a student for learning tanning in Europe. An Officer from the Forest Department has also been sent to Europe to study Forestry.

35. They are men of high educational qualification with scientific training. They are just going to Europe.

36. By Government. In the case of the latter, he has to serve the State in the Forest Department.

37 & 38. Training is not yet commenced.

39. Yes. The proprietor of the Pushpagiri Factory is an expert in weaving.

40. He is supervising his own establishment at Trichur. He also trains a few apprentices. More than this he cannot do.

Industrial Associations.

42. The two Agricultural Associations are Industrial also. But, as already observed, they are not doing much useful work.

(7). CAMBAY STATE.

A.—Agriculture.

1. The condition of Agricultural Industry, in the Cambay State is pretty much the same as in the surrounding British and Gaekwadi districts.

2. A very large part of the cultivable area is brought under cultivation.

3. The Cambay soil consists of three varieties, gorad or red, black and brown. The eastern half of the State contains red and brown soil with some sweet water wells capable of being used for irrigation, while the remaining part of this and the whole of the western block in which black soil preponderates, the water is brackish and hence unfit for irrigation. The eastern block is wooded but the western half is devoid of trees. The main crops are wheat, rice and cotton.

4. The land owning and cultivating classes are in a fairly good condition. The latter are indebted but their interests are being safeguarded by special legislation.

5. Land is held by cultivators on a Ryatwari tenure.
6. (a) Cheap capital is supplied by way of Tagavi advance. Nothing is done as regards (b), (c), and (d).
7. The village co-operative credit system is not yet introduced here, the material being not yet ready.

B.—Manufacturing Industries.

8. Cotton and silk textile fabrics such as carpets, Khadis, Saris, Dhotis etc. are among the most important manufactures in the town and some of the villages of this State. The manufacturers in the city use old fashioned pit looms and are beginning to adopt fly-shuttle hand-looms of the improved pattern ; while village weavers still employ the old fashioned pit looms.

Manufacture of Agate and Cornelian stones into article of use and ornament is another industry of importance in the city of Cambay. The stone comes from outside in this State but it is manufactured here.

9. The above industries are in a fair condition.

10. In the past, black-cloth used to be exported to Arabia and other places but its export has now grown insignificant.

11. The number of people supported by weaving is about 2000 and that of those by stone industry about 1000.

12. The capital employed in the weaving industry in the shape of machines of all kinds is about 25,000 rupees and in the stone industry it is about 9,600 rupees.

The weaving industry requires a working capital of 7 lacs of rupees per year, while the stone industry requires an yearly capital of 5 thousand rupees.

13. Textile fabrics manufactured here are not much affected by imported articles while there is no local importation of stone articles manufactured abroad.

14. The textile fabrics find a market in Ahmedabad, Bombay, the Deccan, Africa and Arabia besides the local one. The stoneware is exported to China, Arabia and Africa through Bombay while the local demand is not very great.

15. The existing arrangements are capable of meeting an increased demand, if any.

16. All the four means are likely to help the existing industries, especially the weaving one, if the people are disposed to avail themselves of them. Methods (a) & (b) have been tried here and found successful in a limited area.

17. Silk, Lac, Paper, and Leather goods were formerly articles of manufacture and export here.

18. Foreign trade.

19. No.

20. Nil.

C.—Mineral and other Natural Products.

21 to 24. There are no minerals here worth mention.

D.—Capital.

25. The local bankers afford these facilities.

26. There are none.

27. Nil.

E.—Technical Education.

28. Young men are trained up at the workshops of local traders. The State affords facilities for training in the weaving industry by introducing it amongst the students of the local Madressa.

29. Nil.

30. Nil.

31. Nil.

32. Provision for training students of the Madressa, in carpentry and weaving has been made, but they do not take advantage of it.

33. As a preliminary measure the Carpentry class was proposed to be opened at the Engineering Department workshop, while the weaving class is opened in a shed, where fly-shuttle looms are provided, with all accessories, the Weaving Master of the Jail weaving, teaching the Mahomedan boys, who attend it for about two hours out of school time.

34. No.

35 to 41. Nil.

F.—Industrial Associations.

42. None.

APPENDIX C

INDIAN PATENTS

APPLICATIONS FILED.

1. Monobar Lal Paneser of Ludhiana, for the " Paneser tiller."

2. Sorabji Byramji Patel of Quetta, for " Patel three Bales Press."

3. Bhim Chandra Chatterjee of Nepal, for the Annada electrolier switch for turning on one, two, three or more lamps or groups of lamps at will, in an electric circuit.

4. Sorabji Muncherji Ratnagar of Bombay, for improvement in Railway carriages.

5. Dhana Ram Hiralal of Nagpur, for a fan.

6. Haji Kutabdin Kazi Hassan of Hyderabad, Sind, for lifting water from a well, tank or other reservoir named "Abas water lifting self-returning wheel."

7. L. Sayanna of Bombay for a centre for forming arches.

8. Chandra Mohan Roy of Lucknow for an improved plough for India.

9. Karim Illahi and Nabi Baksha of Aligarh, for improvements in padlocks.

10. Kartar Singh of Rawalpindi, for a composition of matter for the destruction of vermin to be known as " karim-nas."

11. Dinsha Pestanji Ghadiali of Surat, for the utilization of high tension electric spark for permanent and indelible writing without ink.

12. Mahamadally Ebrahimji of Karachi, for improvements in cigarettes, for a box for cigarettes and matches.

13. Nirod Krishna Roy of Calcutta, for preventing the opening of all aerated water bottles without explosion.

14. Ramachandra of Ghazi Khan, for an improvement in lace weaving machine.

15. Maung Then Maung, Nagathaing Young, Burma, for an apparatus for the extraction of ' Nagi Champhor' from ' Blumea Balsamifera' locally known as "Poumathain."

16. P. T. Srinivasa Iyengar of Vizagapatam, for a 'combined school bench and desk.'

17. A. Subramania Servai of Athiakche, Thekkur village, for improved water lift.

18. Lala Jeva Ram Thapur of Rawalpindi, for the top hole rat trap.

19. Charu Chandra Ghosh of Pusa, for a continuous hand spinning machine called "the Pusa continuous spinning machine."

20. Devidin Bhagwandin of Cawnpore, for improved apparatus for splitting dhal or the like and removing the husk.

21. Devidin Bhagwandin of Cawnpore, for improvements in machines for cleaning and polishing *dhal*.

22. L. Raja Babu of Patiala, for automatically preventing railway collisions entitled "Automatic Collision Preventor."

23. Durgadas Gupt, Kawiraj of Calcutta, for comb with two sets of teeth with sprinkler for sprinkling oil in using the comb.

24. Rustomji Hormosji of Nawasari, for process for perfuming Christmas and other pictorial cards and making scented visiting post or any blank cards.

25. Bhawanidas of Bijwar, for a four roller triple squeeze sugar-cane crushing mill.

26. Lala Hiralal Bensal of Kundian, for manufacturing hydraulic lime from disintegrated limestone.

27. Bhola Nath Shantra of Howrah, for the pressing of jute.

28. Haradhan Mandal of Howrah, for a pulley power jute press.

29. Fatch Mahomed Deura and Company of Sialkot, for polo sticks.

30. Haripad Dass of Calcutta, for the composition of levers by a greater reaction produceable than the original action employed.

31. Poyyai Krishnan Vatikakum Desan of Tellicherry, for a new self-acting water pump.

32. Syed Mahomed Wajir of Hilsa, for a water-lift called "Mojib's water-lift."

33. Hukumchand of Bakhalapur, for bullock power engine.

34. Hari Dhan Mandal of Howrah, for pulley power jute press regulated by means of connecting rods linked to the crankshaped ends of its arms.

35. Tarakh Nath Mukerji of Belghoria, for an improved gate for the manufacture of Cooking Pans, etc.

36. Mirza Mohomed Islam Beg of Lahore, for a water lifting machine named "Butler Charsa Lifter."

37. A. Subramania Servai of Authikadu, Thekkur, for a water lift.

38. K. E. Chalthan Sahib of Trichinopoly, for an improved machine for polishing, boring, cutting rubies, diamonds and other precious stones.

39. Ramji Das Bhargawa of Lucknow, for Urdu and Persian Nastalique types to be called Shamsi type.

40. V. Gurusawmi Mudaliar of Madras, for a self-emptying night soil and sewage water cart.

41. Krishna Rao Shivrampant Pimperkar of the Central Jail, Coimbatore, for an improved automatic loom to be worked by pedal motion.

42. Wazir Khan Mistry of Jubbulpore, for a threshing machine to be called "Wazi threshing machine."

43. Karwal Lakshmi Narayan Rao of Nadiad, for the patent Nib.

44. Gangadhar Luxman Karve of Indore, for a slide rule

45. Ramji Das & Co., of Sialkot, for a Racket.

46. Dattatrya Atmaram Gadkari and Kanialal Nandlal Pandit both of Kaire, for a kind of shoe made of wood and canvas called the "Novelty shoe."

47. Sorabji Muncherji Ratnagar and Dosabhai. Manekji Wadia both of Bombay, for improvements in or relating to carding engines.

48. Manwar Khan of Calcutta, for a plough.

49. Pirojsha B. Godrej of Bombay, for improvements in the insulating material of safes.

50. Hukumchand, Resident of Jalandhar, Punjab, for improved suspension fan.

51. Rangaswami Iyengar of Tanjore, for a water-lift.

52. Kesrichand of Nagpur, for a medicine to cure wound, leprosy and diseases of the blood, piles, &c.

53. Ibrahim Hoosain of Calcutta, for springless disc machine, and universal needleless sound reproducing box for phonographs.

54. Karim Ilahi and Nabi Baksh of Aligarh, for a new or improved double bolt lock.

55. Mahboob Ali Khan of Hyderabad, for brown boot polish.

56. Furdoonji Nowroji Furdoonji of Bombay, for improvements in reins.

57. Bawa Narain Singh of Amritsar, for hand power wheel.

58. Tanjore Kadambar Amrithlinga Achary of Madras, for a machine to draw out rough flattened copper (or any other metal) rods into various specific shapes of smooth and well defined, curved and angular plates or flat pices or frames required for various uses, such as, being covered with gold plates and made into bangles, &c. by goldsmiths.

SPECIFICATIONS FILED.

1. Mirza-Mohamed-Manzur-ali-Khan of Delhi, for improvements in the construction of hand looms.

2. Prakash Chandra Chatterji of Calcutta, for a fly shuttle loom to be called the "Shree Krishna Loom. No. 1."

3. T. Rangaswami Iyengar, Thingalore of Tiriu wadi post, for improvements in self-filling and emptying bucket antifricition pulley bearings for water-lifts and the like.

4. Pirojshaw Burjorji Godrej of Bombay, for improvement in safes.

5. Jawhar Singh of Jawalapur, for a sewing in wood-sole-boots.

6. Alladad Khan Nidad of Bhawalpur, for writing two sheets of paper simultaneously in any language with the same version in all inks to be called "Nidads Bihokder Pen."

7. P. S. Subramaniya Iyer of Rangoon, for a verticle hand loom.

8. P. Mooroo gesa Charry of Madras, for type-writing machine for typing Tamil characters and groups of characters.

9. Durgadas Gupta of Calcutta, for a comb combined with sprinkler for sprinkling oil in using the comb.

10. Jyotish Chandra Chakravarthi of Calcutta for model filter.

11. Krishna Chandra Das of Calcutta, for an improved form of chimneyless Kerosine lamp entitled " Patent Chimneyless Sri Krishna lamp."

12. Pirojsha Burjorji Godrej of Bombay, for improvements in locks.

13. Manohar Lal Paneser of Ludhiana, for Panzer tiller.

14. Shaikh Abdul Rahiman and Shaik Abdul Karim both of Delhi, for improvements in the thrust bearings of sugarcane mills and the like.

15. Harmusji Kharsetji Bana of Nadiad, for the improved Hydraulic pump.

16. Nirod Krishan Roy of Calcutta, for preventing an explosion in the opening of aerated water bottles styled "R. Neeriad's Nalrodropate."

17. A. Subramania Servai of Athikadu, Thekkur village, Madura district, for an improved water-lift.

18. Akbar-alli of Ludhiana, for positive picking tape-weaving machine.

19. Ashutosh Mukerjee of Calcutta, for a specific for removing paints.

20. Ramnath Mandal of Calcutta for improved Harmonium reeds and improved hand and portable Harmoniums.

21. Sorabji Byramji Patel of Quetta, for improvements in Hydraulic baling presses.

22. Dhanaram Hiralal of Nagpur, for a fan.

23. Dossabhai Manekji Wadia of Bombay, for improvements in cotton carding engines.

24. Bhimchandra Chatterji of Nepal, for the Annanda electrolier switch for turning on one, two, three or more lamps or groups of lamps at will in an electric circuit.

25. Rahimattulla Islam of Bombay, for improvements in locks.

26. Sorapati Ghatak of Calcutta, for an improved simple paddy boilers,

27. V. Guruswami Mudaliar of Madras, for a waterlift known by the name "The Ganga hand water-lift.

28. Hem Chandra Roy of Calcutta, for producing two copies of writing at the one and the same time called "Double writer."

29. Ramprasad Hiralal Yadha of Baroda, for a loom to be called "Indra Raja loom."

30. M. Mohamad Din & Co., of Peshawar cantonment, for polo sticks.

31. Ramaswami Mudally and Balasundra Naicker of Madras, for burgler proof safe guarding safes entitled "improved device for safe-guarding safes."

32. Syed Mohomed Waigh of Hilsa, Patna, for a waterlift to be called Majib's water-lift."

33. Mahomedally Ebrahimji of Karachi, for improvements in cigarettes.

34. Lala Raja Babu, A. D. C., to H. H. the Maharajah and Superintendent of the Palace Games Department, Patiala State, for automatically preventing railway collisions, entitled "Automatic collision preventor."

35. P. V. Moorogapah Auchary of Georgetown, Madras, for hand-cuffing thieves when attempting to open iron safes.

36. Sorabji Muncherji Rutnagar of Bombay, for improvements in railway carriages.

DESIGNS FILED.

1. Kamar-ally Taijab-ally of Bombay, for wall paper with pictorial design.

2. Joggi Mal and Gowardhan Das of Delhi, for a disc for necklaces bearing specified words on each side.

3. Y. Samuel of Thichinopoly, for a brief bag.

4. Rakhal Chandra Das of Calcutta for "chottoordole" or "conveyance for a bridegroom."

5. Prabhudayal and Laxmandas of Delhi, for disc for necklaces bearing specified words on each side.

6. Panjabi Uttam Singh Maya Ramchandra Soni of Bombay for watch chains, bangles, etc.

APPENDIX D

JOINT STOCK COMPANIES

Number and particulars of Joint Stock Companies registered in each Province in British India in the thirteen months ending November 1909.

No.	Name of Company and situation of its Registered Office.	Object.	Capital.
I.—BANKING AND INSURANCE.			
(a) BANKING AND LOAN.			
1	Instalment Bank, Fyzabad, U. P. ...	Banking etc. ...	20,000
2	Bank of Peshawar, North-West Frontier Province... ..	Banking and agency business ...	2,00,000
3	Union Bank, Tanjore, Madras ...	Banking ...	2,00,000
4	Chidambaram Sri Sivagaminatha Sasvatha Jananukula ...	Money-lending (Mutual) ...	75,491
5	Karuna Nidhi, South Arcot, Madras ...	Money-lending ...	84,000
6	Hindu Monthly Savings Fund, 6th Branch, Madras ...	Banking and loan business ...	5,00,000
7	Birbhum Loan Company, Bengal ...	Banking and commission agency ...	2,50,000
8	Punjab Commercial Bank Lahore, Punjab ...	Do. ...	5,00,000
9	Indian Banking Company Lahore, Punjab ...	Banking business ...	3,00,000
10	Jagadguru Bank, Athire, Bombay ...	Do. ...	19,980
11	Sri Venkataramana Vilasa Bank, Tanjore, Madras... ..	Money-lending ...	20,000
12	Triplacane Sri Parthasarathy Swamy Hindu Dahana Sahatya ...	Banking, Insurance and Trading ...	20,000
	Ela Nidi, Triplicane, Madras ...		
	Reliance Co., Trichinopoly, Madras ...		

No.	Name of Company and situation of its Registered Office.	Object.	Capital.
13	Calicut Bank, Calicut, Madras	Banking	50,000
14	Punjab Mercantile Bank, Amritsar, Punjab	Banking and Trading	5,00,000
15	Frontier Bank, D. I. Khan N. W. Frontier Province	Banking and General Agency	2,50,000
16	Shri Sitarani Mercantile Bank, Karnool, Madras	Banking	4,00,000
17	Sonamgani Mohajani Soniti, Sylhet, E. B. and Assam	Money lending and trading	20,000
18	Shaistagni Sammilita Swadeshi Bhandar, Sylhet E. B. and Assam	Banking, trade and cultivation...	20,000
19	National Bank of Upper India, Shahajahanpur U. P. of Agra, and Oudh	Banking etc.	10,00,000
20	Viravandipudur Sri Lakshmi Karma Villasa Nidhi, Coimbatore, Madras	Money lending	1,00,000
21	Vellore Mercantile Bank, North Arcot	Banking	1,00,000
22	Vasistapuram Indian Shaswat Paropakar Nidhi, South Arcot, Madras	Money lending	50,000
23	Tiruvaleeswar Hindu Janopakara Nidhi, Triplicane, Madras	Banking	20,000
24	Kanagasabapathy Dravida Sahaya Prize Nidhi, Tinnevely	Money lending	not known
25	Sunamganji Rada Krishor & Loan Company, Sylhet, Eastern Bengal and Assam	Money lending	20,000
26	Rajbari Bank, Faridpur	Do.	30,000
27	Jessore Banking and Trading Co., Bengal	Bankers, money lenders	50,000
28	Shri Krishna Bank, Guntur, Madras	Banking	5,00,000
29	Tanjore Town Bank, Tanjore Fort, Madras	Banking	1,00,000
30	Jessore United Bank, Bengal	Banking business	50,000
31	Bombay Merchants Bank	Do.	1,00,00,000
32	Bassein Brothers Company, Bassein, Burma	Money-lending	1,00,000
33	Habiganj Byabasha Sammilani, Sylhet	Banking, trade etc.	1,00,000
34	Rouse, Bromfield and Co., Bangalore	Banking and trading	60,450

35	Indian Native Craft Insurance Co., Bombay	...	Marine Insurance of country crafts	...	10,500
36	Indian Equitable Insurance Co., Bengal	...	Insurance business	...	10,00,000
37	Northern India Insurance Company, Lahore, Punjab	...	Do.	...	10,00,000
38	Pan-Indian Insurance Co., Bengal	...	Do.	...	10,00,00,000
39	Satyra Narayan Marine and Fire Insurance Company, Surat, Bombay	...	Marine Insurance of Boats and Crafts etc.	...	5,00,000
40	Bharat Insurance and Mutual Relief Fund	...	Insurance and Commercial and Estate	...	2,50,000
41	D. I. Khan, N. W. F. Province	...	Agency	...	2,00,000
42	Indian Amicable Society, Madras	...	Life Assurance and Trading	...	20,000
43	Chattagram Jewan Bana Company, Chittagong, Eastern Bengal and Assam	...	Carrying on business of Insurance of all kinds	...	20,000
44	Indian Insurance Trust Company, Jubbulpur, C. P.	...	To assist Policy Holders for creating a Trust Fund to secure greater benefits in the insurance of their lives etc.	...	20,000
II.—TRADING.					
(a) NAVIGATION.					
44	Bengal steamship Co., Bengal	...	Business of carriers by land and water	...	10,00,000
45	Indian Co-operative Navigation and Trading Co., Bombay	...	Carriers by sea and rivers	...	30,00,000
(b) OTHERS.					
46	South Indian Railway Co-operative Stores Society, Trichinopoly, Madras	...	Co-operative Stores	...	20,000
47	Amrit Bazar Patrika Bengal	...	Printers, Publishers etc	...	1,00,000
48	Rangoon Motor Transport Company, Rangoon, Burma	...	Carriers of goods and passengers and general agents	...	2,00,000
49	Dana-Bawgar Company, Katha, Burma.	...	Carrying on the business of Shop-Keepers, Proprietors of Land and Buildings etc	...	50,000
50	J. Maloney and Company, Hanthawadi, Burma	...	Manufacturers of bricks, tiles, etc	...	60,000
51	National Co., Sundri, Bengal	...	General Traders	...	20,000
52	Gorakhpur Tanning Factory, Gorakhpur, U. P.	...	Carrying on the business of tanning and trade	...	50,000

No.	Name of Company and situation of its Registered Office	Object	Capital
53	Papalos, Lahore; Punjab.	... Manufacturing cigars and cigarettes etc. ...	1,50,000
54	Shree Samartha Vyapar Olejak Company, Kulalkoti, Bombay.	... Grocers ...	5,000
55	Marsland Price and Company, Bombay	... Engineers, Importers. etc ...	6,00,000
56	Madras Automobiles, Madras.	... Motor Cars and Cycle Manufacturers ...	50,000
57	Conjeverum Industrial Company, Chingleput, Madras	... Weaving and Trading ...	20,000
58	Sri Amrigai Vilas Industries, Tanjore, Madras	... Weaving and Trading ...	50,000
59	Hindu Co-operative Stores, Bombay	... Manufacturers and Dealers in Swadeshi Articles ...	1,00,000
60	Madras Publishing Company, Madras	... Printers, publishers etc. ...	20,000
61	Gujrath Industrial Manufacturing Company, Bombay	... Manufacturing and Selling Articles ...	25,000
62	Howra Engineering, Bengal	... Engineers and Contractors ...	25,000
63	British Indian Automatic Gas Co., Bengal	... Manufacturers of Gas and Gas Apparatus ...	1,20,000
64	Indian Perfume Company, Bengal	... Manufacturers and dealers in Essential Goods ...	2,00,000
65	Kirana Company, Cawnpore	... General Merchants ...	1,00,000
66	Cocanada Trading and Stable Company, Cocanada, Madras	... Stable keepers, Contractors, etc. ...	10,000
67	Bengal Boots, Bengal	... Manufacturers of leather goods ...	50,000
68	C. Broomfield and Company, Bengal	... Carrying on General Business of Hotel keepers ...	3,15,000
69	East India Rolling Mills, and Iron and Steel Manufacturing Company, Ranjipurwa, U. P.	... Manufacturing Iron... ...	3,00,000
70	Upper Mail Company, Lahore, Punjab...	... Construction and Rental of Buildings ...	2,25,000
71	Punjab Trading Company, Lahore	... Carrying on Business of Agents, Traders and Contractors ...	2,00,000
72	General Stores and Supply Company, Bombay	... Grain Sellers and General Store Keepers... ...	25,000
73	Broach Hosiery Knitting Company, Bombay, Broach	... Manufacturers of Hosiery ...	1,00,000

74	Inamdar Agency Company, Bombay	...	Commission Agents	...	50,000
75	John Marshall and Company, Bombay	...	Dealers in Machinery	...	1,50,000
76	Ganguli Brothers Co., Tiptera, E. B. and Assam	...	Co-operative Manufacturing Agency	...	50,000
77	Trail & Co., Bengal	...	Printers, Stationers etc	...	1,50,000
78	Prayag Publishing Company, Allahabad	...	Printers and Publishers etc	...	20,000
79	Darbhanga Agrawal Company, Bengal	...	General Traders	...	30,000
80	Lee and Benson, Bengal	...	Engineers, Builders etc	...	100,000
81	Ganga Glass Works, Cawnpur	...	Manufacturing Glass and Glass-Ware	...	1,50,000
82	Stem Laundry, Do.	...	Washing Cloths etc	...	30,000
83	Engineers and Contractors Company, Amritsar	...	Engineers, Contractors, Manufacturers	...	2,50,000
84	Indian Moulding Manufacturing and Industries Company, Bombay	...	Frame and Design Makers etc	...	1,25,000
85	Karnatik Vyaparottejak Company, Gadag, (Bombay)	...	Dealers in Grain, Medicine etc	...	20,000
86	Ratna Vilas Cardamom Sales Company, Madura	...	Trading in cardamom	...	1,00,000
87	Dehri Rohtas Tramway Company, Bengal	...	Constructing Tramway between Dehri, Sone and Rohtas	...	5,00,000
88	Arakan Agricultural Co-operative Society, Arakan, Burma	...	Providing credits for its members and to grant loans	...	2,00,000
89	Motor House Company, Rangoon, Burma	...	Dealing in Motor Cars and Accessories	...	1,00,000
90	Burma Chemical Industries, Rangoon	...	Dealing in Chemical Industrial preparations	...	5,00,000
91	India Automobile Service, Bengal	...	Carrying Mails and Passenger by Automobiles	...	6,00,000
92	Utkol Tannery Co., Bengal	...	Manufacturing leather and leather goods	...	2,00,000
93	Cook & Company, Bengal	...	Business of importer and sellers of horses and stable keepers	...	4,00,000
94	Bara Swadeshi Bhandar, Pabna, E. B. & Assam	...	Dealing in country goods and to open small industries etc.	...	20,000
95	Niphamari Trading & Banking Company, Rangpur	...	Trading in country goods and to establish factories for indigenous industry	...	50,000
96	Scientific & Technical Manufacture Company, Lahore, Punjab	...	Manufacturing scientific and technical apparatus	...	50,000

No.	Name of Company and situation of its Registered Office	Object	Capital
97	India Felt Topee Manufacturing Company, Bombay	... Manufacture of Topees, caps, etc.	3,00,000
98	Western India Match Works, Bombay	... Match Manufacturers	1,00,000
99	Madras Glass Works, Madras	... Manufacturers of glassware, pottery, etc.	2,00,000
100	Bombay Co-operative Pioneers Union, Bombay	... Manufacturers of drugs and Chemical goods	50,000
101	News and Publishing Agency, Cawnpore, U.P. of Agra and Oudh	... Printing and Publishing	1,00,000
102	Rajshahi Bhandar, E. B. & Assam	... Trading in indigenous goods and promoting Indian arts and Industries	50,000
103	Mymensing Knitting Works, Mymensing, E. B. & Assam	... Manufacturing, dyeing bleaching cotton, silk, etc.	...
104	James Glendye, Bengal	... Manufacturers of Tickets, Labels, Presses, etc.	1,20,000
105	Indian Horse Dak and Carrying Company, Gurdaspur, Punjab	... Carrying goods and Passengers in Northern India	1,12,000
106	Lakshmi Pharmacy, Bombay	... Manufacturers of drugs and chemicals	1,00,000
107	Bhusawal Railway Dairy Company, Bhusawal, Bombay	... Dealers in milk, butter, etc.	5,000
108	Sri Mahalakshmi Iron Work, Nadiad, Bombay	... Iron and Brass Founders	40,000
109	Hanman Weaving Company, North Arcot, Madras	... Weaving and Trading	20,000
110	Kistnadevarayo Sangam, Guntur, Madras	... Printing and Publishing	15,000
111	Anglo-Burma Motor Transport Co., Rangoon, Burma	... Carrying passengers and goods in Bassein District	2,00,000
112	Dacca Iron Factory, Dacca	... Manufacturing and repairing articles	50,000
113	Dinapore Tannery, Bengal	... Manufacture of boots	50,000
114	Calcutta Real Property Company, Bengal	... General Contractors	20,00,000
115	Punjab Engineering Company, Lahore, Punjab	... Starting Foundry and Workshop	2,00,000
116	National Import and Export Company, Peshawar	... Commercial and estate agency	5,00,000
117	Nagardas Foot Loom Weaving Co., Surat, Bombay	... Traders of Foot-loom cloth	25,000

118	Mahamundal Shashtra Prakash Samiti, Benares	...	Carrying on business of publishers and stationers	...	2,50,000
119	Burma Lac Refinery, Rangoon, Burma	...	Refining Shellac, gums, etc	...	3,00,100
120	Sugatpur Swarna Lakshmi Trading Co., Sylhet	...	Banking, Trade and Agriculture	...	20,000
121	Orrissa Lime Co., Bengal	...	Lime Burners and dealers in stone	...	1,00,000
122	Jessore, Comb, Button and Mat Manufacturing Co., Bengal	...	Manufacturers in Comb, buttons, etc.	...	50,000
123	Rathi Manufacturing Co., Delhi, Punjab	...	Manufacturing Hosiery, laces	...	1,00,000
124	Lawell General Trading and Manufacturing Co., Allahabad, U.P.	...	General Trade	...	50,000
125	Bombay Glass Manufacturing Company, Bombay	...	Manufacturing glass and glassware	...	1,00,000
126	Aryan Trading Company, Madras	...	Trading in metals and metal wares	...	1,00,000
127	Punjab General Transport Company, Lahore	...	Constructing Railways and Tramways in the Punjab or elsewhere	...	5,00,000
128	Madras Stores, Rangoon	...	Promoting Co-operation among members.	...	10,000
129	Provident Co-operative Society, Bengal	...	General merchants	...	20,000
130	London Warehouse Co-operative Stores, Lahore	...	Silk Merchants	...	2,50,000
131	Caledonian Printing Company, Bengal	...	Printers, Publishers and Stationers	...	1,50,000
132	Panthic Printing and Publishing Company, Amritsar, Punjab	...	Do.	...	1,00,000
133	Virja Nand Printing Works, Allahabad	...	Printing and Publishing	...	1,00,000
134	Allahabad Engineering Works, Allahabad	...	Dealing in stone, wood, iron, etc.	...	50,000
135	Cawnpore Hosiery Works, Cawnpore, U. P.	...	Manufacturing goods	...	20,000
136	Aniline, and Alizurine Trading Company, Ahmedabad	...	Washing and Dyeing	...	1,00,000
137	Anglo Indian Empire Syndicate, Bombay	...	Printers and Publishers	...	10,000
138	Burbadhan Trading Co., Rangoon	...	General Merchants	...	30,000
139	Rangpur Swadeshi, Bhandar-Rangpur	...	Trading in indigenous produces	...	25,000
140	Eureka Manufacturing Company, Bengal	...	Manufactures of porcelain goods	...	1,00,000
141	Arya Chemical Works, Bengal	...	Manufactures and dealers in chemicals	...	20,000
142	Engineering and Mercantile Company, Amritsar, Punjab	...	Manufacturing and dealing in articles made of metals	...	2,50,000
143	Southern Maratha Pottery Work, Dharwar, Bombay	...	Manufacture of Pottery Works	...	40,000
144	India Agency Co., Bombay	...	Commission Agents	...	5,00,000

No.	Name of Company and situation of its Registered Office	Object	Capital
III.—MILLS AND PRESSES.			
<i>(a) COTTON MILLS.</i>			
145	New Madras Spinning and Weaving Company, Bombay	... Ginning, Pressing, Spinning, Weaving, dyeing, etc. ...	4,00,000
146	Callian Cotton Mills, Bengal	... Cotton, Jute, etc. ...	12,00,000
147	Jamal's Cotton and Produce Company, Rangoon, Burma	... Ginning, Pressing, extracting oils, etc. ...	30,00,000
148	Virudupatti Gins, Tinnevely, Madras	... Ginning, Cotton, etc. ...	50,000
149	Bombay Weaving and Manufacturing Company, Bombay	... Weaving, Dyeing Cotton, Silk, etc. ...	1,00,000
150	Swan Mills, Bombay	... Spinning Cotton, Jute, etc. ...	1,00,000
151	Aryan Cotton Mills Co., Bengal	... Spinners, Weavers, etc. ...	5,00,000
152	Burma Spinning, Weaving and Produce Company, Rangoon	... Cultivating, Spinning and Weaving ...	30,00,000
153	Prince Mills, Bombay	... Spinning and Weaving Cotton ...	1,00,000
154	Spinning and Weaving Company, Guntur, Madras	... Spinning and Weaving Cotton ...	17,00,000
155	Victor Spinning and Weaving Manufacturing Co., Lyallpur, Punjab	... Manufacturing, Bleaching, etc. articles of cotton, silk ...	20,00,000
156	Molla Dawoods Cotton Manufacturing Company, Rangoon	... Ginning, Spinning, Weaving, Dyeing, Bleaching cotton, wood, etc. ...	25,00,000
157	All-India Spinning and Weaving Mills, Lahore	... Manufacturing, Dyeing, Printing and Bleaching cotton ...	4,00,000
158	<i>(b) OTHER MILLS AND PRESSES.</i>		1,00,000
159	Bombay Oil Manufacturing Company, Bombay	... Extracting oil by crushing seeds ...	15,000
160	Cawnpore Jute Company, Bengal	... Manufacturers and Merchants of jute, etc ...	6,00,000
161	Shri Bhowsingji Cotton Seed Oil Manufacturing Company, Bombay	... Extracting oil from cotton seeds ...	1,00,000
162	Woollen and Cotton Spinning and Weaving Mills Company, Agra, U.P.	... Manufacturing wool etc. ...	30,000
163	Lakshmi Paper Mills Co., Madura, Madras	... Manufacturing paper, etc. ...	
163	Hateshi Company, Gurgaon, Punjab	... Manufacturing oils, hours, etc. ...	

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